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MONTHLY WEATHER REVIEW

SEPTEMBER 1942

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IMPORTANT NOTICE

The insert map on Climatological Chart no. 5, which shows departures of precipitation from normal, was discontinued beginning with October 1941 and continuing through July 1942. Publication of this insert was renewed beginning with the August issue; and the maps for the intervening months are included in this issue.

MONTHLY WEATHER REVIEW

Editor, EDGAR W. WOOLARD

VOL. 70, No. 9
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SEPTEMBER 1942

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COMPARATIVE OBSERVATIONS WITH FRIEZ-TYPE RADIOSONDES AND FERGUSSON METEOROGRAPHS

BY L. F. HAFER

[U. S. Weather Bureau, Washington, September, 1942]

For the purpose of obtaining comparative data on the performance of the two types of instruments, a Fergusson meteorograph was attached to each radiosonde released at Omaha, Nebraska, during the two periods October 19–November 2, 1939, and February 13–23, 1940, inclusive. The observations during the first period were begun at approximately 0245 E. S. T., and those for the second period at about 0145 E. S. T.

The radiosondes, weighing approximately 1,100 grams, were of the modulated audio-frequency type manufactured by J. P. Friez & Sons. The Fergussons, weighing approximately 300 grams, had the records imprinted on smoked aluminum sheets.

The assembled outfit was comprised of the following: A 700-gram balloon, a 72- by 72-inch red silk parachute fastened 6 inches below the neck of the balloon, a drag balloon inserted in the ring of the parachute, and a Fergusson approximately 15 feet below the radiosonde.

Twenty-seven meteorographs were released during these two periods and twenty-two usable records were obtained. One record was lost due to the clock stopping, another due to the instrument hitting the side of the building at release, and a third record was obliterated. Two of the instruments have not been returned to date.

The radiosonde records were evaluated while the observations were in progress. However, the Fergussons had to be returned by their finders before the data could be computed and comparisons made. When the evaluated record of one of the instruments failed to show a significant level shown by the other, the original record of the one not showing the change was rechecked to determine whether a significant level had been omitted in the evaluation.

Corresponding records were plotted on the same adiabatic chart so that comparisons could readily be made. Realizing that the surface level might not be a suitable locking point as far as pressure values were concerned, a locking point was selected at some significant level soon after release. Because of this fact, some of the radiosonde records were displaced in pressure, although later investigation showed that due to a slight shift in pressure at release on some of the Fergussons it might have been better in most cases to displace the Fergusson pressures. However, for comparative purposes, as long as the displacement was small it made little difference which curve was displaced. This action was considered justified in view of the shift in the Fergusson pressure trace just mentioned and also the fact that the error in the radiosonde release pressure setting might be as much as 3 or 4 millibars. There was no good reason for locking the temperature curves at any point other than the surface and, therefore, this was not done in any case. On 7 days the records were plotted without any displacement whatever. However, on the remaining 15 observations, a displacement varying from 3 to 21 millibars was necessary. The radiosonde pressure values were decreased an average of 12 mb. on 13 days and increased an average of 6 mb. on 2 days.

Figures 1 and 2 show the daily departures of the radiosonde temperatures from those recorded by the meteorographs. In plotting these curves, the temperature differences were noted for significant levels and plotted at the corresponding Fergusson pressures, unless the latter were believed to be erroneous.

In figure 1 it will be noted that there is a concentration of the curves between the one degree lines on either side of the Fergusson. All of the significant points, with the exception of two, are within the 2° lines. In figure 2 practically all points lie within the range from +1.5° C. to −2.0° C., with a significant grouping of the curves near the −1° C. line.

Figures 3 and 4 show average departures of the radiosonde temperatures from those recorded by the Fergussons. In the October-November 1939 series, there is a tendency for the average radiosonde temperatures in the lower levels to be nearly equal to or slightly higher than those of the Fergusson. However, from 700 to 250 mb. the trend is for the radiosonde to become lower and continue lower throughout the remainder of the observation. In the February 1940 series, the average temperatures in the lower levels are also nearly identical. The radiosonde then shows a tendency to be higher than the Fergusson between 750 and 500 mb. From 500 to 300 mb. the radiosonde averages slightly lower, and from 300 to 80 mb. the two temperatures again are nearly identical. Above 80 mb. the radiosonde becomes somewhat higher than the Fergusson. The average curve for the two seasons shows that at pressures greater than 600 mb. there is very little difference between the temperatures recorded by the two instruments. For pressures less than 600 mb. the radiosonde temperatures average slightly lower than those of the Fergusson except near the top of the curve which is based on only one observation.

Figure 5 shows the temperature-pressure comparisons between the two instruments for eight selected observations. The radiosonde pressures for observations 2, 4, and 8 were not displaced. The radiosonde pressures for observation 1 were decreased 12 mb. for locking purposes; those for observations 3 and 5 were decreased 6 mb.; observation 6 increased 7 mb.; and, observation 7 decreased

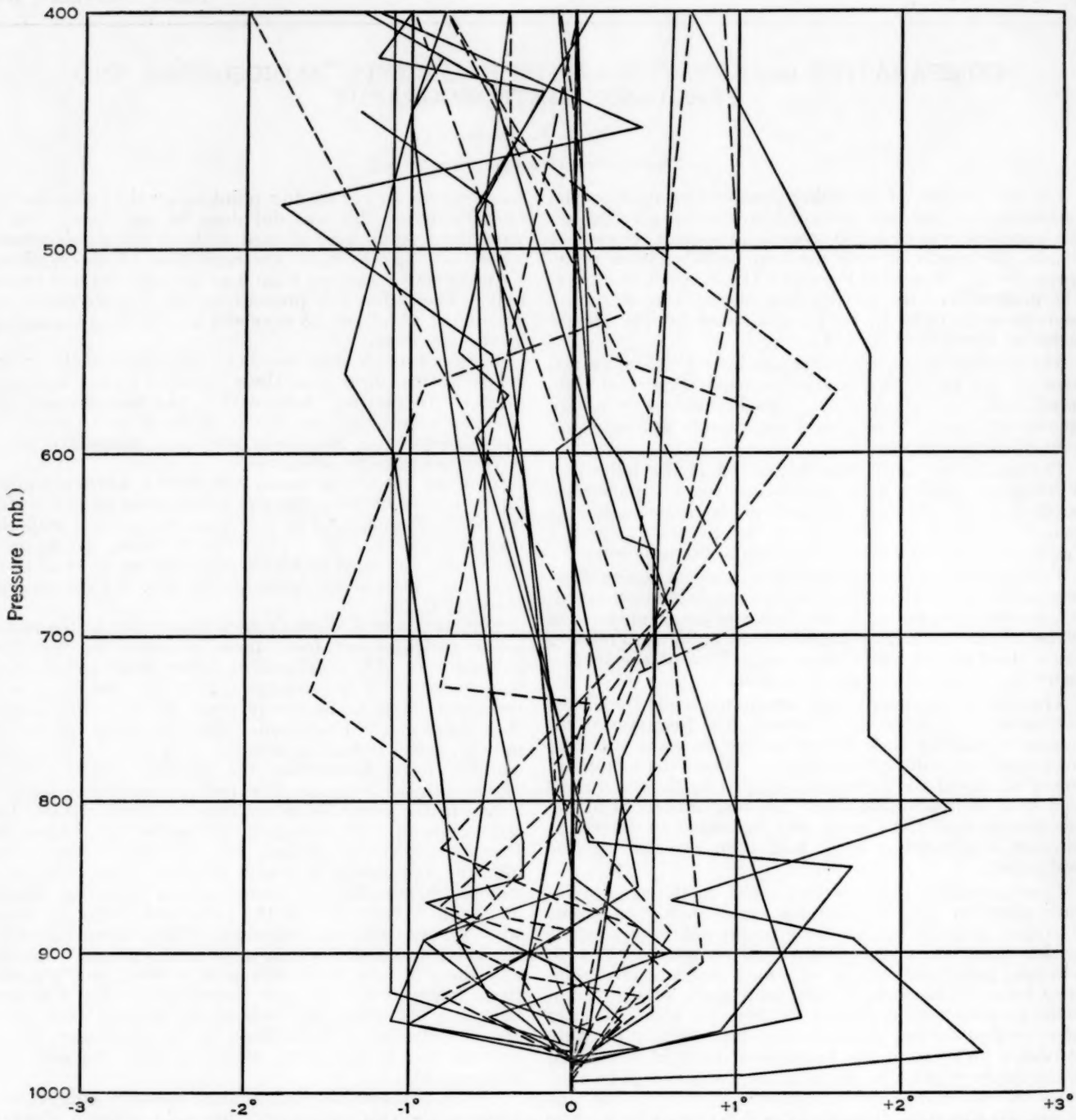


FIGURE 1.—Departures (in °C.) of radiosonde temperatures from Fergusson meteorograph temperatures. Heavy vertical line, Fergusson meteorograph record; full line, recor made during October–November 1939; dashed line, records made during February, 1940.

20 mb. These 8 records were selected for the following reasons:

No. 1. In this case the Fergusson record was returned by the finder more than 2 years after being released. The record was good except for the upper portion, which was obliterated.

No. 2. Selected as the one outstanding example of the one instrument showing an inversion not recorded by the other. (See records between 842 and 826 mb.)

Nos. 3 and 4. Selected as being the worst two comparisons of the 22 observations.

Nos. 5 and 6. Selected as representing the average comparisons.

Nos. 7 and 8. Selected as representing the best two comparisons.

Of the 21 relative humidity comparisons obtained, 11 showed good agreement (i. e., practically the entire record within 10 percent), 9 were fair and 1 was poor due to the Fergusson trace sticking. (See No. 3 in figure 6.) In the case of the 9 fair comparisons, the trends were almost identical, but the magnitudes differed. In 5 of the 9 cases, the Fergussons showed greater range, while in 3 cases the radiosondes had the greater range. In another case the radiosonde range was greater at high humidities and the Fergusson range greater at low humidities. However, this latter case is not a characteristic behavior of the two instruments.

Figure 6 shows the relative humidity comparisons between the two instruments for the same observations as in figure 5, except that no comparison is available for observation No. 2 (made on October 23, 1939). These records are believed to be fairly representative of all the observations.

It is extremely difficult to make good flight comparisons between the pressures of the two instruments. The necessity for a displacement of some of the pressure curves has been pointed out. Generally, after the displacement was made and a good locking point obtained, there was very good agreement between the pressures recorded by the two instruments, i. e., within 10 mb. or less, with an occasional difference of as much as 20 or 25 mb. in the lower levels. A notable exception was the comparison made on February 19, 1940. In this case the Fergusson pressure calibration apparently changed between the time of calibration and release. The pressure element expanded too much in flight and as a result all pressures appear to be too low (approximately 70 mb. difference at the top of the observation).

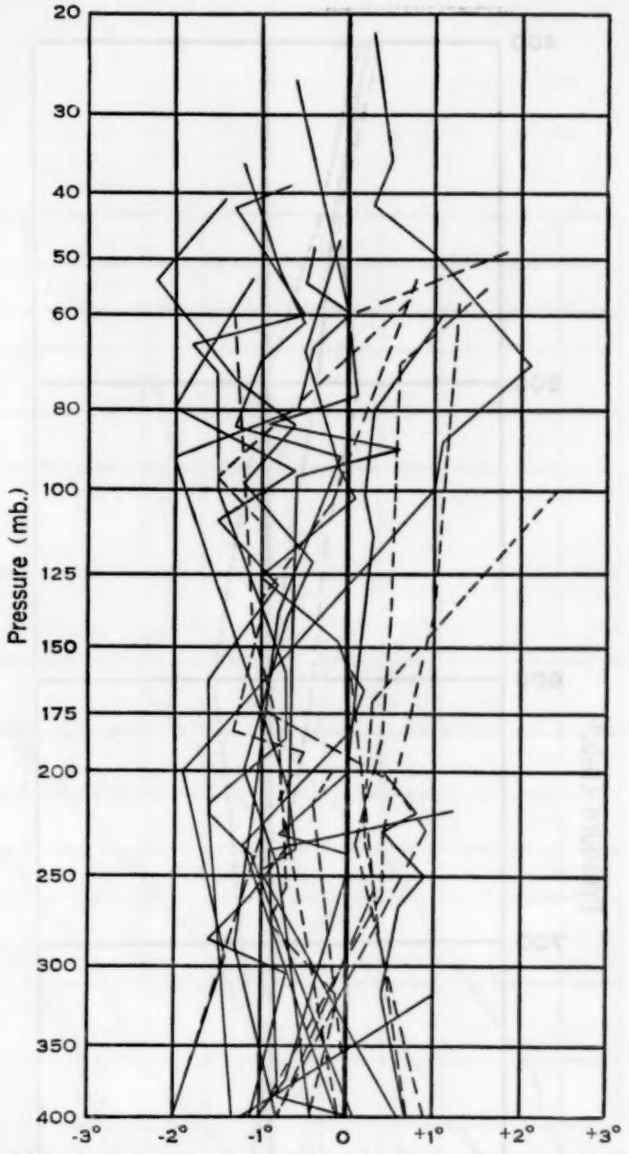


FIGURE 2.—Departures (in °C.) of radiosonde temperatures from Fergusson meteorograph temperatures. Heavy vertical line, Fergusson meteorograph record; full line, records during October–November 1939; dashed line, record during February 1940.

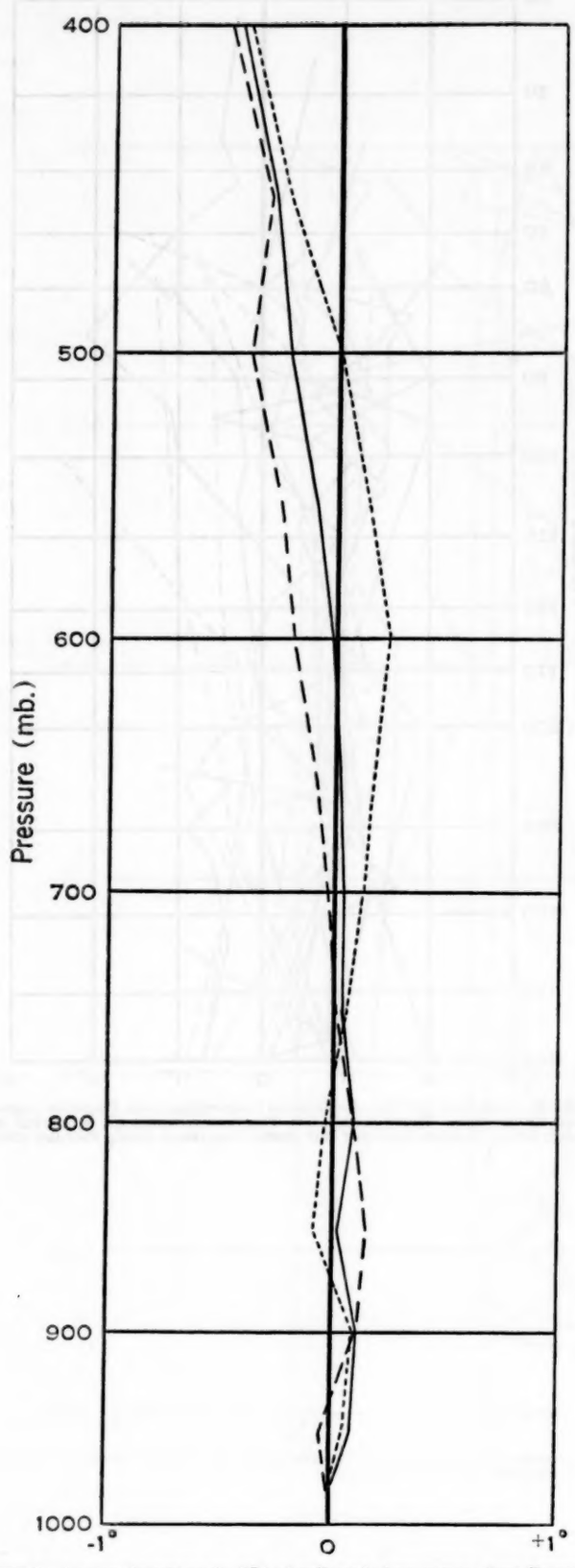


FIGURE 3.—Average departures (in °C.) of radiosonde temperatures from Fergusson meteorograph temperatures. Heavy vertical line, Fergusson meteorograph record; full line, October-November 1939 and February 1940; long dashed line, October-November 1939; short dashed line, February 1940.

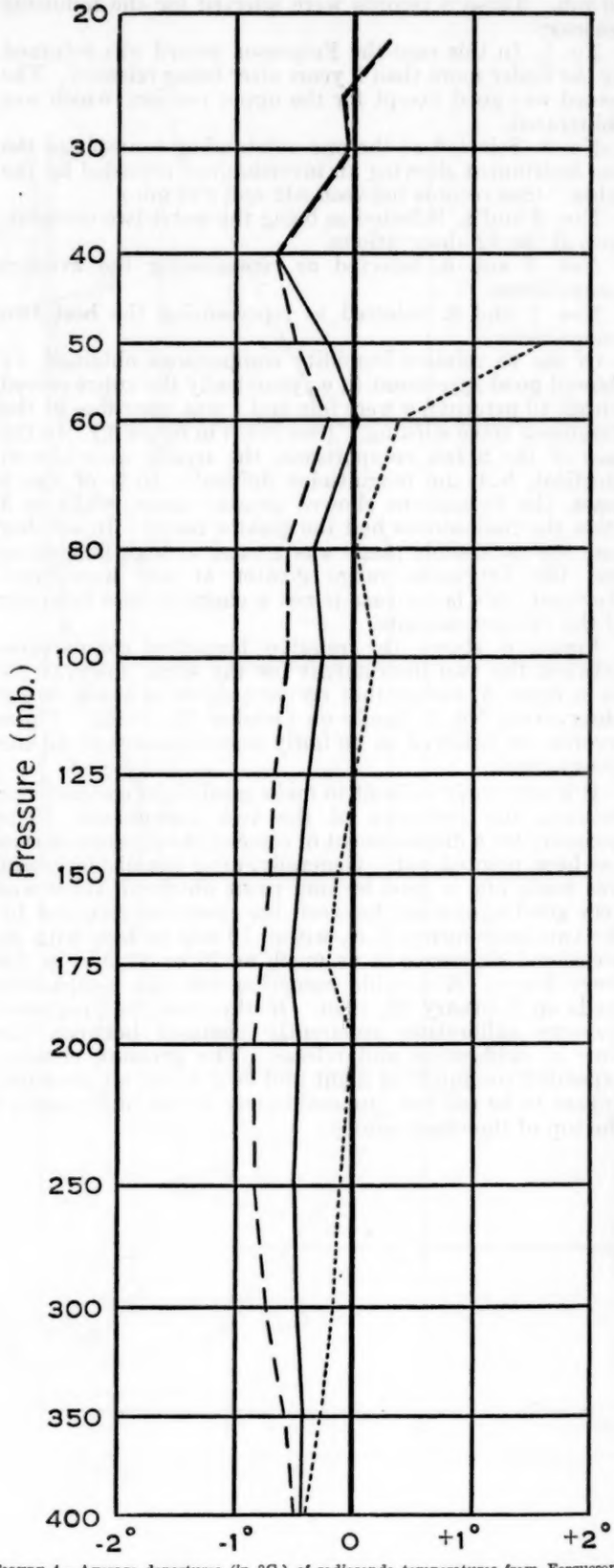


FIGURE 4.—Average departures (in °C.) of radiosonde temperatures from Fergusson meteorograph temperatures. Heavy vertical line, Fergusson meteorograph record; full line, October-November 1939 and February 1940; long dashed line, October-November 1939; short dashed line, February 1940.

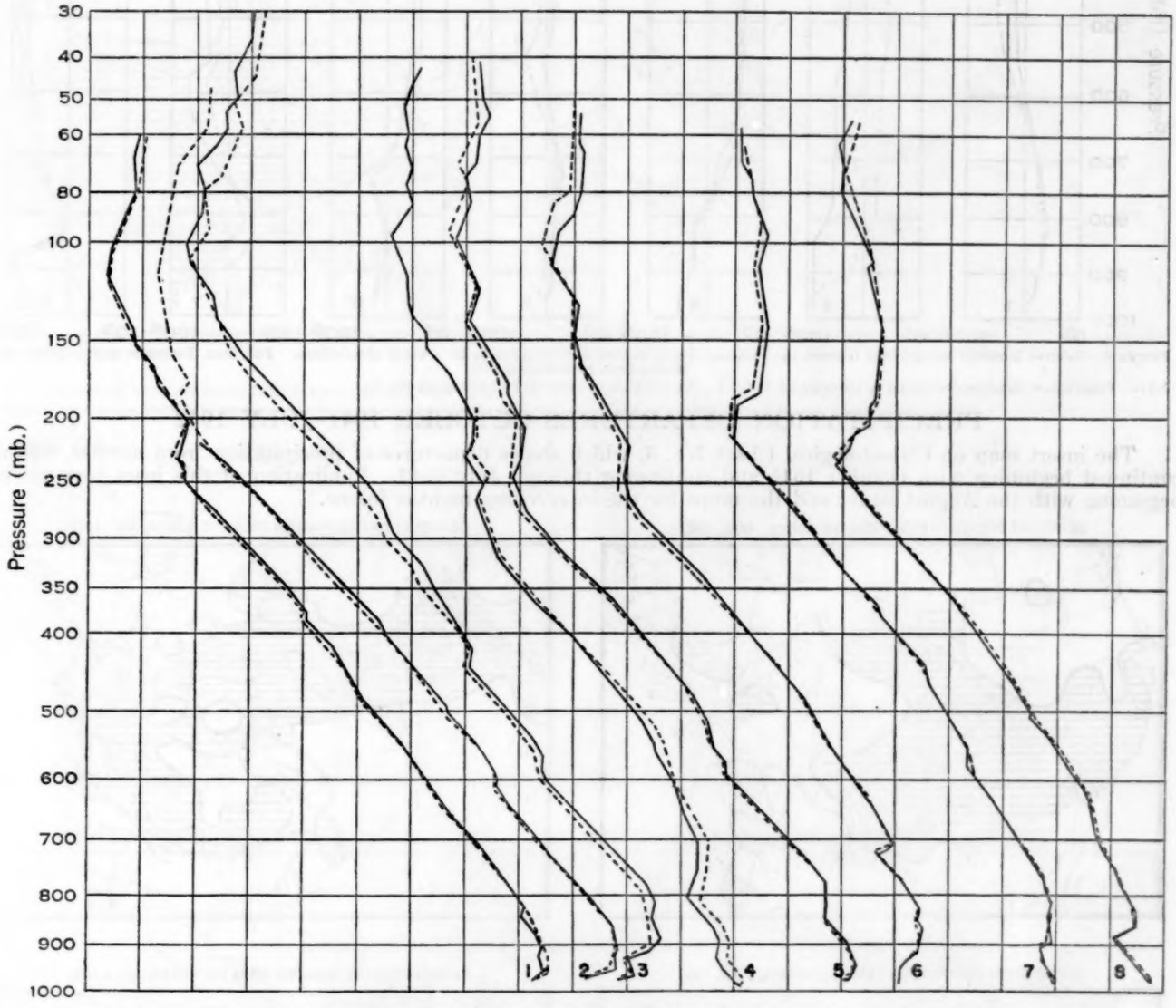


FIGURE 5.—Temperature-Pressure comparisons between the radiosonde and Fergusson meteorographs for selected observations. Full lines, Fergusson meteorograph records; dashed lines, radiosonde records; abscissa interval is 10° C.

[1] Instruments released on October 19, 1939, at 0250 E. S. T., release temperature=12.2° C.
[2] Instruments released on October 23, 1939, at 0242 E. S. T., release temperature=12.1° C.
[3] Instruments released on October 26, 1939, at 0245 E. S. T., release temperature=8.5° C.
[4] Instruments released on October 28, 1939, at 0252 E. S. T., release temperature=1.2° C.
[5] Instruments released on October 29, 1939, at 0246 E. S. T., release temperature=10.0° C.
[6] Instruments released on October 31, 1939, at 0245 E. S. T., release temperature=0.8° C.
[7] Instruments released on February 18, 1940, at 0042 E. S. T., release temperature=0.0° C.
[8] Instruments released on February 20, 1940, at 0104 E. S. T., release temperature=—1.9° C.

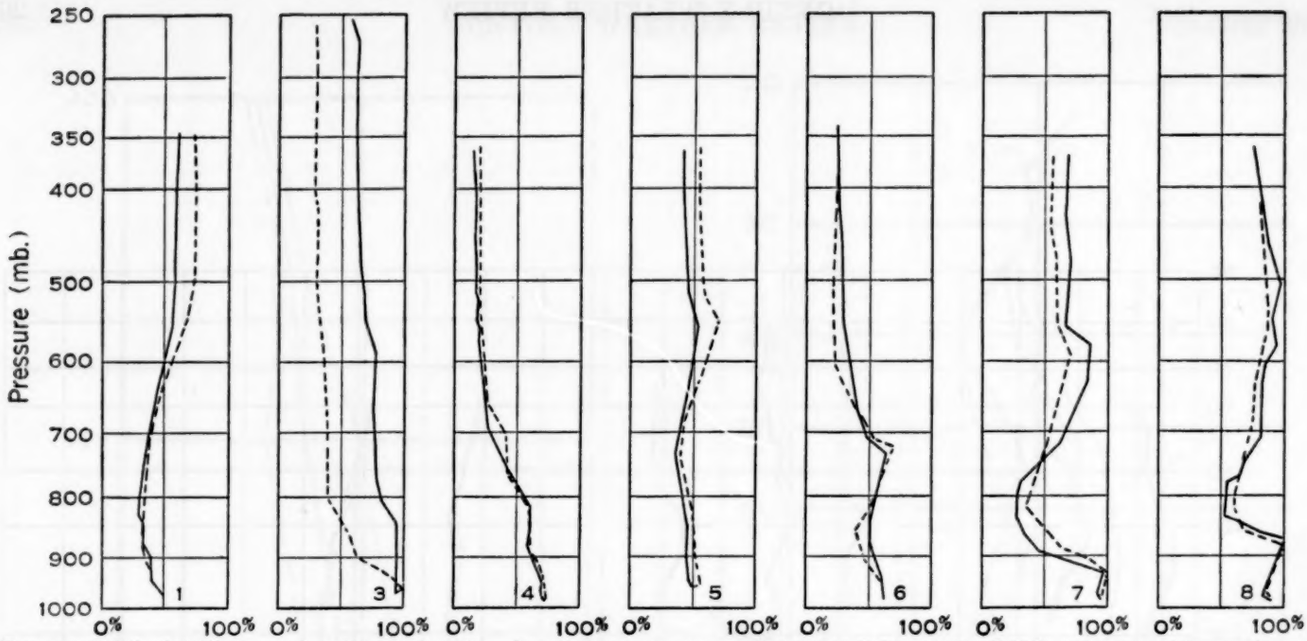


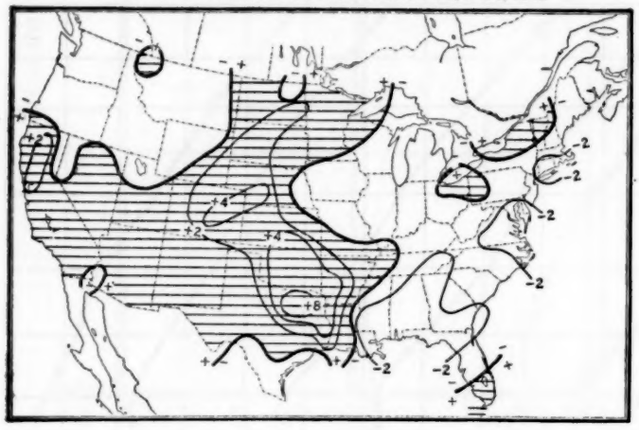
FIGURE 6.—Relative humidity comparisons between the radiosondes and Fergusson meteorographs for selected observations. Full lines, Fergusson meteorograph record; dashed lines, radiosonde record.

NOTE.—Observation numbers correspond to those shown in fig. 5. (No comparison available for observation No. 2.)

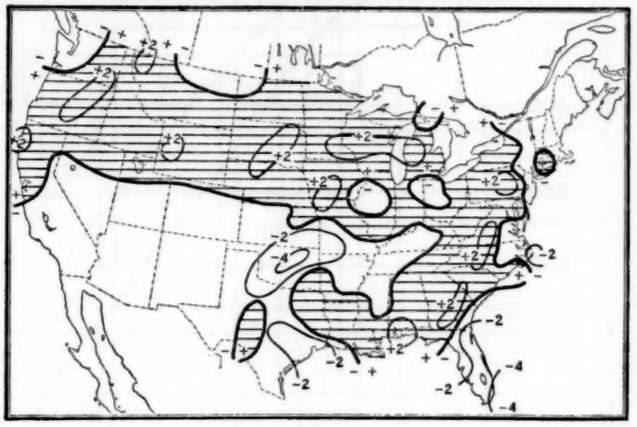
PRECIPITATION DEPARTURES OCTOBER 1941–JULY 1942

The insert map on Climatological Chart No. 5, which shows departures of precipitation from normal, was discontinued beginning with October 1941 and continuing through July 1942. Publication of this inset was renewed beginning with the August issue; and the maps for the intervening months follow.

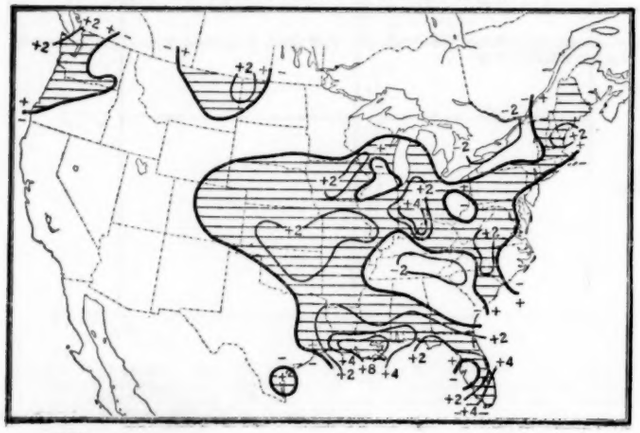
DEPARTURE OF PRECIPITATION FROM THE NORMAL, APRIL, 1942



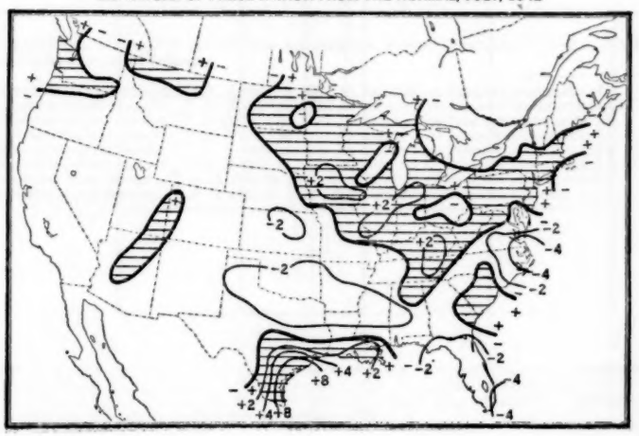
DEPARTURE OF PRECIPITATION FROM THE NORMAL, MAY, 1942



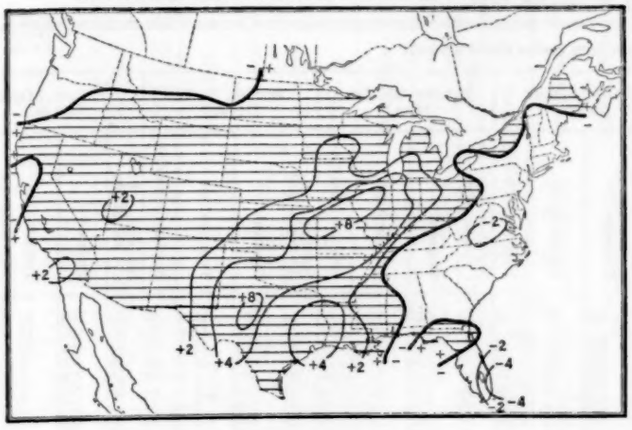
DEPARTURE OF PRECIPITATION FROM THE NORMAL, JUNE, 1942



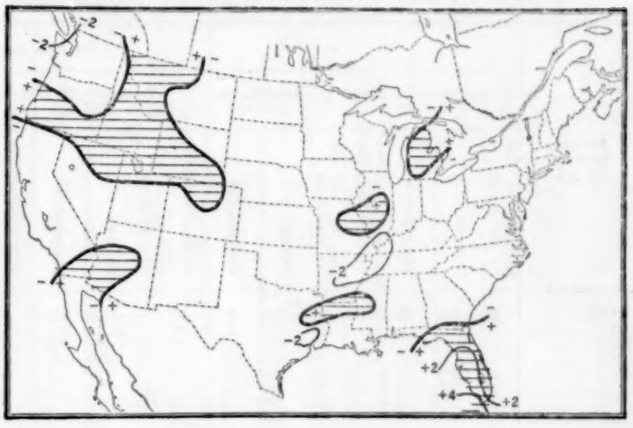
DEPARTURE OF PRECIPITATION FROM THE NORMAL, JULY, 1942



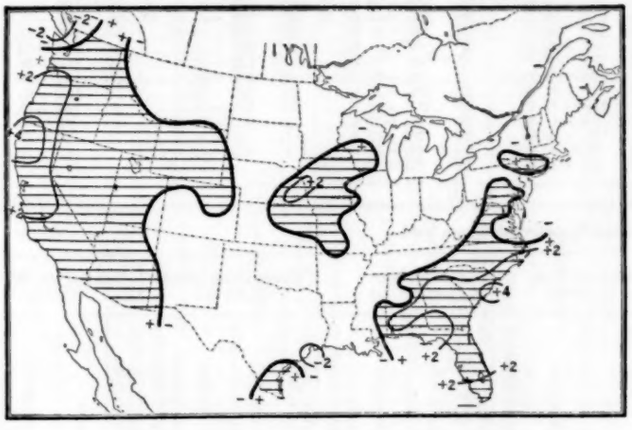
DEPARTURE OF PRECIPITATION FROM THE NORMAL, OCTOBER, 1941



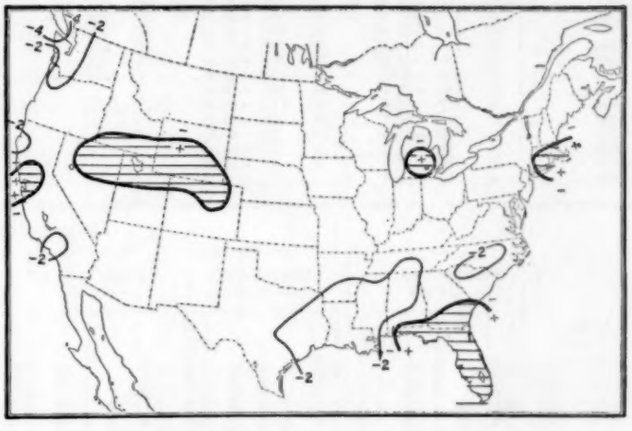
DEPARTURE OF PRECIPITATION FROM THE NORMAL, NOVEMBER, 1941



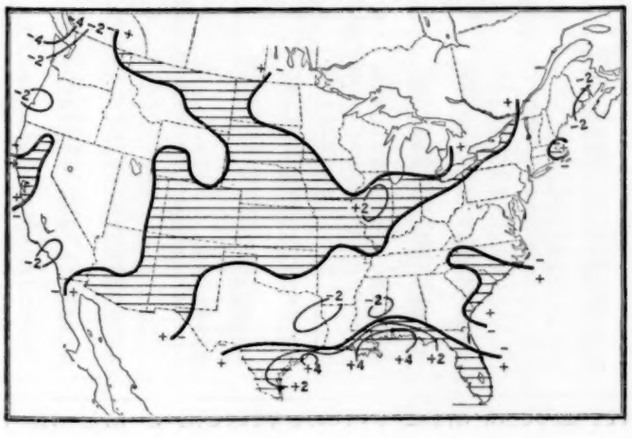
DEPARTURE OF PRECIPITATION FROM THE NORMAL, DECEMBER, 1941



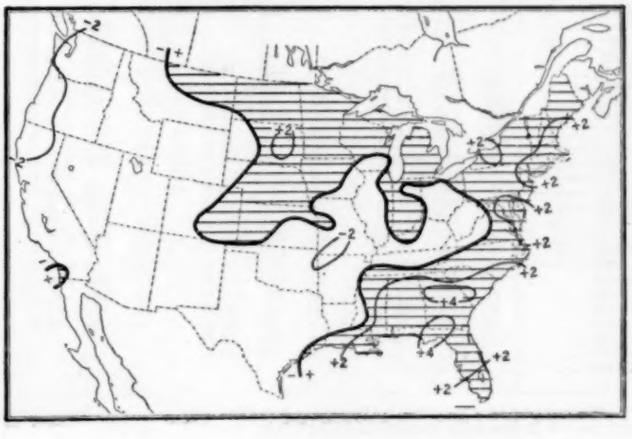
DEPARTURE OF PRECIPITATION FROM THE NORMAL, JANUARY, 1942



DEPARTURE OF PRECIPITATION FROM THE NORMAL, FEBRUARY, 1942



DEPARTURE OF PRECIPITATION FROM THE NORMAL, MARCH, 1942



METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR SEPTEMBER 1942

[Climate and Crop Weather Division, J. B. KINCER, in charge]

AEROLOGICAL OBSERVATIONS

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by radiosondes during September 1942*

Stations and elevations in meters above sea level

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,620 m.)				Atlanta, Ga. (300 m.)				Bismarck, N. Dak. (505 m.)				Boise, Idaho (868 m.)				Brownsville, Tex. (6 m.)				Buffalo, N. Y. (221 m.)				Caribou, Maine (191 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	29	839	20.1	43	30	984	19.9	83	30	956	11.6	74	29	914	17.3	44	30	1,014	24.1	87	30	991	15.0	80	30	994	10.8	81
500					30	961	21.2	69									30	958	22.4	85	30	959	15.4	72	30	958	12.4	69
1,000					30	907	19.3	70	30	901	12.7	62	29	900	19.9	41	30	905	19.8	79	30	904	12.7	69	30	902	10.2	65
1,500					30	856	16.8	72	30	850	10.2	60	29	849	19.3	36	30	854	17.2	74	30	852	10.0	69	30	850	7.5	67
2,000	29	803	19.4	42	30	807	14.2	67	30	799	7.3	59	29	801	15.7	36	30	804	14.7	69	30	801	7.9	62	30	799	5.4	63
2,500	29	757	16.2	42	30	760	11.5	62	30	752	4.3	54	29	754	11.9	36	30	758	12.4	65	30	754	5.8	58	30	751	3.4	57
3,000	29	713	12.6	42	30	716	8.8	56	30	707	1.6	50	29	710	8.2	38	30	714	9.9	62	30	709	3.5	54	30	706	1.2	56
4,000	29	632	5.3	44	29	634	3.7	54	30	624	−4.0	48	28	628	1.2	39	30	633	4.3	62	29	627	−0.7	52	28	623	−3.1	49
5,000	29	559	−1.5	46	29	560	−1.6	48	30	549	−10.4	49	28	554	−5.7	41	30	560	−1.3	60	29	553	−5.7	47	27	549	−8.8	46
6,000	28	492	−7.6	44	29	493	−7.6	43	29	481	−17.1	47	28	487	−12.8	40	30	493	−6.9	59	29	486	−11.8	45	26	482	−14.5	43
7,000	28	433	−14.0	43	29	433	−14.3	40	29	420	−23.8	42	28	426	−20.5	38	30	433	−13.2	54	28	426	−18.5	43	26	422	−21.1	42
8,000	28	378	−21.2	42	29	379	−21.3	37	28	365	−31.0	41	28	372	−28.0	37	30	379	−19.8	52	26	371	−25.6	44	26	368	−28.0	41
9,000	28	329	−28.1	41	29	330	−28.6	36	28	317	−38.4	43	27	323	−35.4	37	28	330	−26.8	51	25	322	−32.7	44	25	318	−34.9	40
10,000	28	286	−35.4	41	28	286	−36.3	36	24	273	−45.8	----	27	279	−42.6	----	28	287	−34.2	51	25	279	−39.6	42	25	276	−41.8	----
11,000	26	248	−42.4	----	28	247	−43.7	----	20	235	−51.2	----	25	240	−49.4	----	28	249	−41.9	----	25	240	−46.2	----	24	237	−48.6	----
12,000	26	213	−48.8	----	28	213	−50.8	----	15	201	−53.2	----	23	205	−54.1	----	28	214	−49.6	----	21	206	−52.6	----	24	204	−54.1	----
13,000	26	183	−54.9	----	28	182	−57.3	----	11	173	−53.7	----	23	176	−56.8	----	28	183	−56.8	----	17	176	−57.9	----	24	174	−56.8	----
14,000	25	156	−60.5	----	27	155	−63.4	----	8	148	−55.6	----	23	150	−59.2	----	27	156	−64.0	----	16	150	−61.7	----	24	148	−60.0	----
15,000	25	133	−65.4	----	26	131	−68.0	----					22	127	−61.2	----	27	132	−70.5	----	11	127	−63.4	----	22	126	−61.3	----
16,000	23	112	−68.8	----	25	111	−69.6	----					22	109	−62.7	----	25	111	−74.8	----	10	108	−64.8	----	19	108	−61.6	----
17,000	20	95	−69.3	----	23	94	−69.1	----					18	92	−62.6	----	24	94	−75.4	----	9	91	−64.6	----	15	92	−61.3	----
18,000	18	80	−67.3	----	16	79	−67.0	----					14	78	−62.0	----	23	79	−72.0	----	7	76	−63.3	----	11	78	−60.4	----
19,000	14	68	−64.8	----	11	67	−64.1	----					11	66	−60.6	----	20	67	−67.6	----	6	65	−61.7	----	7	67	−59.0	----
20,000	12	58	−62.6	----	5	57	−61.6	----					6	56	−59.0	----	15	56	−63.3	----								
21,000	6	49	−59.3	----													8	48	−59.7	----								

Stations and elevations in meters above sea level

Altitude (meters) m. s. l.	Charleston, S. C. (14 m.)				Denver, Colo. (1,616 m.)				Detroit, Mich.* (217 m.)				El Paso, Tex. (1,193 m.)				Ely, Nev. (1,908 m.)				Great Falls, Mont. (1,128 m.)				Huntington, W. Va. (172 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	29	1,016	22.1	92	30	840	14.3	57	30	990	13.1	90	30	882	21.6	52	30	810	13.3	25	30	888	13.5	60	29	998	17.0	90
500	29	961	21.9	72					30	958	14.3	72													29	960	18.5	76
1,000	29	907	18.8	76					30	902	11.7	70													29	906	16.2	72
1,500	29	855	16.0	75					30	850	9.5	66	30	852	21.8	48					30	849	12.9	58	29	854	13.3	71
2,000	29	806	13.6	70	30	803	14.8	56	30	800	7.5	58	30	804	18.7	48	30	802	15.3	26	30	800	10.1	58	29	804	10.6	70
2,500	29	760	11.2	62	30	756	11.8	57	30	752	5.8	56	30	758	15.3	52	30	756	14.9	26	30	753	6.9	59	29	757	8.4	66
3,000	29	715	8.7	58	30	712	8.6	56	30	708	3.5	57	30	714	11.8	53	30	712	10.7	26	30	708	3.9	60	29	713	6.0	64
4,000	29	634	3.7	56	30	630	2.1	55	30	625	−.7	50	30	633	4.9	58	30	630	2.5	28	30	626	−2.5	60	29	630	1.4	59
5,000	27	560	−1.8	50	30	556	−4.8	54	30	551	−6.2	43	30	560	−1.4	63	30	556	−4.6	31	29	551	−9.4	62	29	556	−3.7	54
6,000	25	493	−7.7	48	29	489	−11.8	51	30	484	−12.3	38	29	493	−7.3	61	30	489	−11.6	29	29	483	−16.0	61	29	489	−9.8	48
7,000	24	433	−14.2	44	29	428	−18.7	47	29	424	−18.9	34	29	433	−13.6	55	30	428	−19.4	28	29	422	−23.1	58	29	429	−15.9	43
8,000	24	378	−21.0	42	29	374	−25.5	45	29	370	−25.8	33	29	379	−20.5	51	30	373	−27.0	27	28	367	−30.5	56	29	375	−22.7	41
9,000	23	329	−28.1	40	28	325	−32.8	44	29	322	−32.7	33	29	330	−27.5	49	29	324	−35.0	27	28	318	−38.1	57	28	326	−29.9	40
10,000	22	286	−35.9	38	27	281	−40.3	----	29	279	−39.8	31	29	287	−34.9	47	29	281	−42.0	----	27	275	−45.2	----	27	283	−37.2	38
11,000	21	247	−43.7	----	26	242	−47.2	----	29	240	−46.6	----	29	248	−42.2	----	28	242	−47.8	----	27	236	−51.1	----	27	244	−44.7	----
12,000	18	213	−51.1	----	26	208	−53.1	----	26	206	−52.8	----	28	214	−49.5	----	26	207	−52.7	----	26	202	−54.0	----	25	210	−52.0	----
13,000	17	182	−58.0	----	25	178	−57.9	----	21	176	−57.6	----	27	183	−56.5	----	24	177	−56.3	----	26	173	−55.5	----	24	180	−58.5	----
14,000	16	155	−63.4	----	24	151	−62.2	----	19	150	−61.4	----	27	156	−63.1	----	22	151	−59.3	----	26	148	−56.2	----	21	153	−64.4	----
15,000	15	131	−67.5	----	22	128	−64.8	----	18	128	−64.8	----	27	132	−68.5	----	22	128	−61.5	----	25	126	−57.1	----	19	130	−69.2	----
16,000	13	112	−70.0	----	20	109	−66.8	----	13	108	−65.8	----	27	112	−72.2	----	21	109	−61.9	----	23	108	−57.6	----	17	109	−71.8	----
17,000	11	94	−68.7	----	19	92	−66.7	----	10	91	−64.5	----	27	95	−72.4	----	19	93	−62.1	----	20	92	−57.7	----	15	92	−71.1	----
18,000	8	79	−66.6	----	14	78	−65.2	----	8	76	−62.6	----	25	80	−69.1	----	17	78	−61.4	----	17	78	−56.9	----	14	78	−69.1	----
19,000					8	66	−62.6	----					23	68	−65.7	----	9	67	−60.1	----	11	67	−58.4	----	13	66	−66.3	----
20,000					6	57	−60.1	----					15	57	−62.1	----	6	56	−58.6	----	6	57	−56.1	----	7	56	−63.8	----
21,000													7	49	−58.9	----												

*Correction: Due to surface readings from a faulty barometer, all pressures in table I for Detroit, Mich., for the month of September 1942 are about 1 mb. too low at the surface and too low in decreasing amounts at upper levels.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by radiosondes during September 1942*—Continued

Altitude (meters) m. s. l.	Joliet, Ill., (178 m.)				Lake Charles, La. (5 m.)				(1) Lakehurst, N. J. (39 m.)				Medford, Oreg. (401 m.)				Miami, Fla. (4 m.)				Nashville, Tenn. (180 m.)				(1) Norfolk, Va. (4 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
	Stations and elevations in meters above sea level																											
Surface	29	996	14.0	88	30	1,015	22.4	88	25	1,013	17.9	82	30	967	20.9	41	30	1,016	25.2	89	30	997	18.9	83	27	1,018	22.4	84
500	29	959	15.1	76	30	959	21.5	75	25	959	19.4	64	30	956	21.4	41	30	960	24.8	78	30	960	19.9	71	27	961	22.3	75
1,000	29	903	12.5	72	30	905	19.2	76	25	905	17.3	65	30	902	19.4	44	30	907	22.0	75	30	906	17.1	68	27	908	19.5	71
1,500	29	851	10.1	69	30	854	17.3	70	25	854	14.8	61	30	851	15.7	48	30	856	19.0	77	30	855	14.8	73	27	856	16.9	68
2,000	29	801	8.0	65	30	805	15.2	63	25	805	12.4	58	30	802	12.3	50	30	808	16.2	73	30	805	12.7	69	27	807	14.7	62
2,500	29	754	5.8	64	30	759	12.7	60	25	758	10.3	55	30	755	9.3	48	30	761	13.5	68	30	759	10.6	63	27	761	12.0	59
3,000	29	709	3.9	60	30	715	10.2	55	25	714	8.1	54	30	711	6.6	45	30	718	10.9	63	30	714	8.2	61	27	716	9.1	57
4,000	27	626	−1.3	53	30	634	5.1	50	25	632	3.4	48	30	629	1.1	40	30	636	5.2	60	29	632	2.8	59	27	635	3.1	58
5,000	27	552	−7.3	50	30	560	−.3	44	25	559	−2.2	48	30	555	−5.0	36	30	562	−.5	58	28	558	−2.5	54	25	560	−2.3	51
6,000	25	485	−13.2	48	30	494	−6.3	45	23	492	−8.3	48	30	488	−11.7	35	30	496	−6.2	51	28	492	−8.0	49	22	493	−8.2	47
7,000	25	425	−19.6	45	30	434	−12.6	44	22	432	−14.8	35	30	428	−19.1	33	30	436	−12.3	45	28	432	−14.7	45	15	433	−14.6	46
8,000	25	370	−26.3	44	30	380	−19.2	43	22	377	−21.7	....	30	373	−26.9	33	29	381	−19.0	43	28	377	−21.6	43	....	....	....	....
9,000	24	321	−33.5	44	30	331	−26.1	41	22	328	−29.3	....	30	324	−34.5	32	29	332	−26.0	43	28	328	−28.6	41	....	....	....	....
10,000	24	279	−40.5	....	30	288	−33.3	40	21	285	−37.2	....	30	280	−41.9	....	28	289	−33.4	44	28	286	−36.1	40	....	....	....	....
11,000	24	240	−46.6	....	27	249	−40.8	....	20	246	−44.8	....	30	242	−48.4	....	26	250	−41.1	....	27	247	−43.6	....	....	....	....	....
12,000	24	206	−52.0	....	25	215	−48.3	....	19	211	−51.6	....	30	207	−53.6	....	23	216	−49.0	....	27	212	−51.1	....	....	....	....	....
13,000	24	176	−57.0	....	25	184	−55.5	....	19	181	−57.3	....	29	177	−56.6	....	21	185	−56.6	....	27	181	−57.6	....	....	....	....	....
14,000	21	150	−61.4	....	23	157	−61.9	....	17	154	−61.5	....	29	151	−58.5	....	20	157	−63.4	....	27	154	−63.4	....	....	....	....	....
15,000	21	128	−64.8	....	22	134	−67.1	....	16	132	−64.4	....	28	129	−59.9	....	18	134	−68.8	....	26	131	−67.7	....	....	....	....	....
16,000	18	108	−66.6	....	22	113	−70.1	....	13	112	−64.2	....	28	110	−60.9	....	15	113	−71.4	....	24	111	−69.8	....	....	....	....	....
17,000	16	92	−66.0	....	22	96	−71.4	....	9	94	−62.9	....	24	94	−61.1	....	14	95	−71.2	....	21	93	−70.1	....	....	....	....	....
18,000	15	77	−63.6	....	20	81	−69.5	....	6	80	−61.3	....	22	80	−60.2	....	10	80	−70.4	....	19	79	−67.8	....	....	....	....	....
19,000	12	66	−61.1	....	20	68	−66.8	....	....	....	....	....	16	68	−59.5	....	8	68	−68.6	....	13	67	−65.3	....	....	....	....	....
20,000	5	55	−59.4	....	16	58	−64.3	....	....	....	....	....	13	58	−58.7	....	6	58	−66.6	....	11	56	−63.1	....	....	....	....	....
21,000	....	....	....	....	11	49	−61.8	....	....	....	....	....	5	49	−57.8	....	....	....	....	....	5	48	−60.1	....	....	....	....	....

Altitude (meters) m. s. l.	Oakland, Calif. (6 m.)				Oklahoma City, Okla. (391 m.)				Omaha, Nebr. (301 m.)				Phoenix, Ariz. (339 m.)				Portland, Maine (20 m.)				St. Louis, Mo. (171 m.)				St. Paul, Minn. (225 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
	Stations and elevations in meters above sea level																											
Surface	30	1,013	15.9	81	30	970	19.0	82	29	981	16.0	81	30	968	26.6	42	30	1,015	12.0	91	30	997	18.4	75	30	989	12.7	84
500	30	956	16.1	73	30	958	19.9	77	29	958	16.5	74	30	951	30.7	33	30	960	14.6	71	30	960	19.0	66	30	958	12.7	74
1,000	30	902	18.6	47	30	905	18.9	68	29	903	14.8	71	30	899	28.9	28	30	904	12.3	70	30	905	16.2	65	30	902	10.5	72
1,500	30	851	17.4	37	30	853	16.5	67	29	851	12.7	69	30	850	25.3	28	30	852	10.2	73	30	854	13.4	66	30	850	7.9	71
2,000	30	802	14.7	34	30	804	14.6	64	29	802	10.6	62	30	802	21.2	29	30	802	8.9	61	30	804	11.1	64	30	799	5.7	66
2,500	30	755	11.5	30	30	758	12.1	61	29	755	8.6	55	30	757	17.0	31	30	755	7.4	56	30	757	9.1	57	30	752	3.7	61
3,000	30	711	8.4	28	30	714	9.3	57	29	710	6.1	49	30	713	12.7	34	30	710	4.5	56	30	712	6.9	50	30	706	1.2	57
4,000	30	630	3.0	25	29	632	4.1	51	29	628	.5	44	30	632	4.8	41	29	628	−.7	50	29	630	1.8	47	30	623	−3.8	49
5,000	29	556	−3.1	24	27	559	−1.2	44	29	554	−5.4	40	29	559	−1.0	39	26	553	−6.1	38	28	556	−3.6	46	29	549	−9.7	46
6,000	29	489	−10.2	24	27	492	−7.3	40	29	487	−11.4	38	29	492	−6.7	31	25	486	−11.9	35	28	489	−9.4	44	29	481	−16.2	42
7,000	29	429	−18.0	24	26	432	−13.6	39	29	427	−18.0	37	28	433	−13.7	27	25	426	−18.5	31	28	430	−16.0	42	29	421	−22.8	41
8,000	28	374	−25.8	24	26	378	−20.9	39	29	373	−24.9	36	28	379	−21.0	26	24	371	−25.7	30	28	375	−23.0	40	29	366	−29.6	41
9,000	27	325	−33.5	24	26	329	−28.1	39	20	324	−32.3	32	28	329	−28.2	26	20	322	−32.9	24	27	326	−30.1	39	28	318	−36.5	41
10,000	27	282	−41.6	....	25	286	−35.6	38	29	281	−39.4	....	28	286	−35.4	25	16	279	−39.9	....	27	284	−37.1	....	27	275	−42.3	....
11,000	27	242	−47.9	....	25	247	−43.0	....	28	242	−46.0	....	28	248	−42.4	....	12	240	−46.9	....	27	245	−44.3	....	25	237	−46.7	....
12,000	27	208	−52.7	....	25	213	−50.4	....	28	208	−51.3	....	26	213	−49.3	....	11	206	−52.1	....	27	210	−51.2	....	21	204	−50.5	....
13,000	26	178	−56.3	....	23	182	−57.0	....	27	178	−55.3	....	26	182	−55.6	....	7	176	−56.1	....	27	180	−57.5	....	16	174	−54.0	....
14,000	25	152	−58.8	....	22	155	−62.7	....	24	152	−58.7	....	25	156	−61.3	....	5	150	−59.8	....	26	154	−62.3	....	11	149	−57.0	....
15,000	24	129	−61.2	....	22	132	−67.7	....	23	130	−61.5	....	25	132	−66.3	....	....	....	....	....	25	130	−66.3	....	10	128	−60.1	....
16,000	24	110	−63.1	....	21	111	−70.7	....	22	110	−63.0	....	24	112	−68.9	....	....	....	....	....	25	111	−68.6	....	9	109	−60.9	....
17,000	22	94	−63.2	....	21	94	−70.2	....	20	94	−62.5	....	24	95	−68.8	....	....	....	....	....	23	94	−68.4	....	6	94	−59.9	....
18,000	19	79	−62.0	....	19	79	−67.9	....	18	80	−60.9	....	22	80	−66.3	....	....	....	....	....	19	79	−66.3	....	....	....	....	....
19,000	13	67	−60.6	....	16	67	−64.6	....	13	68	−59.1	....	18	68	−63.4	....	....	....	....	....	15	67	−63.7	....	....	....	....	....
20,000	6	57	−58.5	....	9	57	−61.2	....	7	58	−57.0	....	12	58	−60.3	....	....	....	....	....	13	57	−61.1	....	....	....	....	....
21,000	....	....	....	....	....	....	....	....	....	....	....	....	6	49	−57.7	....	....	....	....	....	7	48	−58.9	....	....	....	....	....

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidity in percent, obtained by radiosondes during September 1942*—Continued

Altitude (meters) m. s. l.	San Antonio, Tex. (242 m.)				San Diego, Calif.[1] (19 m.)				Sault Ste. Marie, Mich. (221 m.)				(1) Seattle, Wash. (27 m.)				Spokane, Wash. (598 m.)				Washington, D. C. (25 m.)				Anchorage, Alaska (42 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	29	988	22.0	78	30	1,008	18.2	83	30	989	11.2	89	29	1,014	16.1	75	30	944	16.8	48	30	1,015	19.6	80	30	1,007	12.8	76
500	29	960	22.3	76	30	954	17.9	66	30	957	11.5	80	29	959	15.5	63					30	961	18.8	70	30	953	10.8	73
1,000	29	906	19.3	76	29	901	20.2	38	30	901	9.1	79	29	904	13.5	58	30	901	18.4	44	30	906	16.0	70	30	898	7.8	73
1,500	29	855	17.0	76	28	850	19.8	21	30	848	6.4	76	29	852	11.2	57	30	850	14.9	44	30	855	13.5	72	30	844	4.6	77
2,000	29	806	15.0	74	28	802	17.4	15	30	798	3.7	74	29	802	9.3	53	30	800	11.2	47	30	805	11.4	70	30	794	1.6	79
2,500	29	760	13.0	65	28	755	14.2	17	30	750	1.2	68	29	754	5.9	51	30	754	7.7	51	30	758	9.5	66	30	746	−1.1	80
3,000	29	716	10.5	60	27	711	11.1	20	30	704	−.7	58	29	709	2.8	49	30	710	4.5	55	30	714	7.3	61	30	701	−3.2	79
4,000	29	634	5.0	57	25	630	4.7	----	29	621	−5.8	52	29	626	−3.3	41	30	626	−1.5	57	30	632	2.2	54	30	617	−8.4	75
5,000	28	560	−.9	51	25	556	−1.5	----	28	546	−11.5	48	28	551	−9.3	32	30	552	−7.5	57	30	558	−2.6	49	30	541	−14.4	72
6,000	28	494	−6.4	53	25	490	−8.3	----	28	478	−17.6	46	26	484	−15.6	31	30	485	−14.2	56	29	491	−8.3	47	30	474	−20.8	70
7,000	28	434	−12.8	48	24	430	−15.7	----	20	418	−24.1	43	26	423	−22.8	35	30	424	−21.4	54	28	431	−14.7	45	30	413	−27.2	68
8,000	28	380	−19.6	44	12	376	−23.5	----	17	363	−30.7	40	24	368	−30.3	36	28	369	−28.4	53	26	377	−21.7	41	30	359	−34.2	66
9,000	28	331	−26.5	42	12	326	−31.3	----	11	314	−38.1	----	23	318	−38.0	----	27	320	−35.8	52	23	328	−28.7	40	30	310	−41.2	----
10,000	28	288	−34.1	42	12	283	−38.4	----	10	271	−45.3	----	16	275	−46.2	----	27	277	−43.0	----	22	285	−36.1	39	30	268	−46.8	----
11,000	28	249	−41.8	----	11	245	−44.4	----	7	233	−49.1	----	12	236	−54.0	----	26	238	−49.5	----	22	246	−43.8	----	29	230	−49.4	----
12,000	27	214	−49.4	----	10	210	−51.0	----	6	201	−51.6	----	10	202	−59.3	----	24	204	−54.2	----	20	211	−51.0	----	26	197	−50.9	----
13,000	27	184	−56.3	----	10	180	−56.9	----					10	172	−61.9	----	24	175	−55.4	----	20	181	−57.4	----	24	169	−52.0	----
14,000	26	156	−63.2	----	10	153	−62.1	----					9	146	−62.8	----	23	149	−57.0	----	20	154	−62.3	----	24	144	−52.5	----
15,000	25	132	−69.4	----	8	130	−66.6	----					6	124	−62.9	----	23	127	−58.1	----	19	131	−66.0	----	24	124	−53.0	----
16,000	25	112	−73.7	----	6	109	−69.6	----					6	106	−63.0	----	22	109	−58.6	----	16	110	−68.6	----	22	106	−53.1	----
17,000	24	94	−74.9	----													20	93	−58.6	----	16	93	−68.6	----	18	91	−52.9	----
18,000	23	79	−71.8	----													17	79	−57.6	----	16	79	−66.0	----	14	77	−52.6	----
19,000	19	67	−68.1	----													12	68	−56.7	----	13	67	−64.5	----	6	66	−52.4	----
20,000	18	56	−64.3	----													8	58	−56.1	----	9	56	−62.0	----				
21,000	10	48	−61.9	----																	6	48	−59.6	----				
22,000																					6	40	−57.5	----				

Altitude (meters) m. s. l.	Bethel, Alaska (7 m.)				Fairbanks, Alaska (156 m.)				Juneau, Alaska (49 m.)				Ketchikan, Alaska (26 m.)				Nome, Alaska (14 m.)				San Juan, P. R. (15 m.)				Swan Island, West Indies (10 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of Observations	Pressure	Temperature	Relative humidity
Surface	24	1,006	11.5	80	30	992	12.9	62	30	1,010	12.3	83	30	1,014	14.3	76	25	1,006	9.0	84	29	1,013	25.6	88	27	1,011	26.7	86
500	24	948	8.5	82	30	952	10.7	64	30	957	11.4	80	30	959	12.5	76	25	948	6.8	88	29	959	23.6	89	27	956	23.1	90
1,000	24	892	5.3	86	30	897	7.1	68	30	902	9.2	77	30	903	10.4	72	25	892	3.7	88	29	906	20.7	88	27	903	20.4	85
1,500	24	838	2.2	87	30	844	3.7	71	30	849	7.0	76	30	851	8.3	70	25	838	1.2	86	29	855	18.0	83	27	852	17.6	80
2,000	24	788	−.4	88	30	793	.5	73	28	798	4.8	72	30	800	5.9	69	25	788	−.9	82	29	806	15.3	79	27	803	14.8	77
2,500	24	740	−2.7	85	30	745	−2.4	74	25	750	2.8	69	30	752	3.2	65	25	740	−3.3	77	28	760	12.9	74	27	757	12.3	71
3,000	24	694	−5.3	81	30	699	−4.9	71	25	705	.3	65	30	707	.8	57	25	694	−6.0	75	28	716	10.2	69	27	713	9.5	69
4,000	24	610	−11.3	74	30	615	−10.8	71	24	622	−5.3	60	30	624	−4.6	53	24	610	−11.9	73	28	634	4.5	64	26	632	4.0	68
5,000	24	535	−17.4	68	30	539	−17.0	69	20	547	−11.4	58	28	549	−10.7	48	24	535	−18.3	71	27	561	−.9	59	26	558	−1.7	70
6,000	23	468	−23.7	64	28	471	−23.4	66	19	479	−18.0	57	27	481	−17.3	47	24	467	−25.1	65	27	495	−6.8	58	26	492	−7.5	71
7,000	21	407	−30.4	63	28	410	−30.4	66	17	418	−24.9	58	27	420	−24.5	45	24	406	−32.2	61	27	435	−13.3	56	26	432	−13.4	67
8,000	21	353	−37.2	63	28	355	−37.5	63	15	364	−32.2	54	27	365	−32.0	45	24	351	−39.3	60	27	380	−20.1	55	26	378	−20.2	66
9,000	21	305	−43.5	----	28	307	−44.3	----	12	314	−39.4	----	26	316	−39.1	45	24	303	−45.9	----	27	332	−27.2	55	26	329	−27.2	65
10,000	20	262	−48.0	----	28	264	−50.0	----	12	271	−46.2	----	23	273	−45.4	----	23	260	−49.8	----	26	288	−34.7	54	25	286	−34.9	62
11,000	19	226	−48.0	----	28	227	−51.9	----	11	233	−51.7	----	22	235	−50.1	----	23	224	−50.2	----	24	249	−42.2	----	23	247	−43.2	----
12,000	19	194	−47.5	----	28	194	−52.0	----	11	199	−54.7	----	21	201	−53.7	----	23	192	−49.1	----	23	215	−49.9	----	21	213	−51.8	----
13,000	19	167	−47.3	----	26	166	−52.4	----	11	170	−55.1	----	19	172	−55.0	----	22	165	−48.2	----	23	184	−57.9	----	18	182	−60.6	----
14,000	18	144	−47.6	----	23	142	−53.1	----	11	145	−55.4	----	18	147	−55.9	----	21	141	−48.0	----	23	156	−65.3	----	15	154	−69.0	----
15,000	18	123	−47.8	----	22	122	−53.4	----	10	123	−56.6	----	16	126	−57.3	----	17	121	−48.3	----	22	133	−70.7	----	15	130	−76.8	----
16,000	15	106	−47.8	----	21	104	−53.3	----	8	105	−56.6	----	10	107	−58.3	----	15	104	−48.1	----	20	112	−72.6	----	13	109	−81.7	----
17,000	11	92	−47.7	----	14	89	−52.8	----	7	89	−56.1	----	8	92	−58.1	----	10	89	−48.0	----	18	95	−73.3	----	7	91	−82.2	----
18,000	5	79	−47.8	----	11	76	−52.4	----					6	78	−57.2	----	7	76	−47.8	----	17	80	−71.7	----	5	76	−78.9	----
19,000					6	66	−52.2	----													16	67	−68.9	----				
20,000																					11	57	−66.5	----				
21,000																					6	48	−64.0	----				

All observations taken at 11 p. m., 75th meridian time.

None of the means included in this table are based on less than 15 surface or 5 standard level observations.

Number of observations refers to pressure only, as temperature and humidity are missing for some observations at certain levels; also, the humidity data are not used in daily observations when the temperature is below −40° C.

Stations marked with the figure one (1) are Navy stations.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by radiosondes during September 1942*—Continued

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Altitude (meters) m. s. l.	Stations and elevations in meters above sea level								Altitude (meters) m. s. l.	Stations and elevations in meters above sea level							
	Barrow, Alaska (6 m.)				McGrath, Alaska (100 m.)					Barrow, Alaska (6 m.)				McGrath, Alaska (100 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity		Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,009	3.9	91	31	995	15.0	73	9,000	27	302	−46.5		29	309	−41.5	
500	31	949	3.2	79	31	949	12.4	73	10,000	27	260	−50.1		29	266	−47.7	
1,000	31	893	3.0	70	31	894	8.9	78	11,000	26	224	−48.6		28	229	−50.2	
1,500	31	839	1.3	69	31	841	5.5	84	12,000	25	192	−45.8		27	196	−48.9	
2,000	31	788	−1.0	67	31	791	2.4	88	13,000	25	165	−45.0		27	168	−47.5	
2,500	31	740	−3.6	67	31	744	−.3	90	14,000	22	142	−45.0		26	144	−47.4	
3,000	30	694	−6.2	63	31	698	−2.9	90	15,000	20	122	−45.1		25	124	−47.2	
4,000	29	610	−12.1	54	31	615	−8.4	86	16,000	19	105	−44.9		21	107	−47.0	
5,000	29	535	−18.3	48	31	540	−14.4	81	17,000	16	90	−44.6		16	92	−46.7	
6,000	29	467	−25.3	45	31	472	−20.9	78	18,000	12	78	−44.3		9	79	−46.4	
7,000	29	406	−32.4	44	30	412	−27.6	73	19,000	7	67	−44.0		7	68	−45.9	
8,000	28	351	−39.7	45	29	358	−34.5	71	20,000					5	58	−45.4	

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during September 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (538 m.)			Albuquerque, N.Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (866 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)			El Paso, Tex. (1,196 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	190	2.7	30	199	2.0	30	300	0.7	28	297	0.8	29	231	1.2	28	320	4.8	30	97	4.3	30	238	2.4	28	197	1.4	29	159	1.6	28	217	1.0	28	69	2.1	30	168	1.9
500							30	304	0.6										30	96	4.8	30	245	4.1	28	229	3.5	29	178	2.2	28	218	2.6						
1,000	29	184	2.9				30	281	0.7				29	245	1.8	28	319	5.0	28	96	3.2	29	244	6.6	27	238	3.5	28	233	1.3	28	232	3.2						
1,500	29	185	3.5				27	258	1.2	28	315	1.6	27	251	3.4	28	307	3.4	25	102	2.0	25	242	8.9	26	251	6.2	26	265	1.3	27	249	4.7				30	161	1.6
2,000	28	196	3.2	30	210	2.9	26	250	1.8	28	297	2.8	26	270	4.5	28	301	2.9	23	105	1.8	22	258	7.9	21	252	9.2	26	267	2.1	26	263	6.3	28	59	2.4	30	141	1.1
2,500	25	214	2.9	30	232	2.3	25	252	1.9	26	279	4.3	20	287	6.0	28	286	3.4	23	113	2.1	17	260	7.4	16	267	8.4	25	255	2.8	23	269	9.0	27	74	1.9	30	152	0.8
3,000	25	250	2.2	30	270	2.7	23	258	3.0	26	276	6.7	19	278	7.2	28	275	3.3	21	110	1.4	13	255	8.2	10	267	9.4	25	251	3.0	21	271	10.1	27	4	0.5	28	168	0.9
4,000	24	265	3.7	29	284	5.7	22	256	3.8	22	288	9.3	15	289	8.5	27	273	3.1	18	194	0.8	10	264	10.0				23	247	4.3	14	272	10.8	25	286	5.6	28	254	1.8
5,000	24	273	4.1	29	286	6.0	16	256	5.9	19	281	9.9	13	287	9.4	24	287	4.4	16	168	1.7	10	250	11.0				18	245	5.8				25	286	9.6	26	284	1.3
6,000	22	260	3.5	27	272	6.1	13	251	7.2	18	287	11.3	12	285	11.5	23	291	6.2	14	199	2.8							16	251	6.9				20	287	13.7	25	280	1.9
8,000	18	261	4.5	24	256	10.0	11	251	11.1	13	268	12.8	12	284	16.7	20	297	7.2										9	240	7.6				18	279	17.2	22	279	5.4
10,000	15	271	8.8	23	252	13.9				12	263	16.5	10	271	18.4	13	262	8.5																18	274	20.1	21	270	10.0
12,000	15	254	10.8	17	254	17.5										10	260	6.6																16	266	30.3	20	277	14.3
14,000	12	263	11.4																																		18	274	14.0
16,000	10	276	12.0																																		18	267	7.9

Altitude (meters) m. s. l.	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N.C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las, Vegas, Nev. (570 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (15 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	30	226	2.7	30	306	1.8	27	289	0.3	30	315	1.5	27	86	3.2	28	237	2.5	30	163	1.2	30	158	1.1	30	319	2.1	29	105	2.8	30	59	1.1	30	81	0.2	27	271	0.6
500							27	273	1.1				27	90	3.5	28	240	3.3				30	184	2.1	30	320	2.2	29	107	3.7	30	109	1.4	30	220	1.0	26	286	2.5
1,000							27	269	1.8	30	318	2.2	26	142	0.8	27	245	3.9	30	166	2.2	29	187	1.8	30	329	1.9	29	96	3.0	28	114	2.0	29	249	2.0	25	283	3.8
1,500							27	276	2.5	29	307	2.9	22	256	1.6	26	258	5.4	30	174	2.3	28	246	2.2	29	277	0.7	29	86	2.8	26	115	1.5	28	264	3.4	21	281	4.8
2,000	30	223	3.4	30	299	2.4	25	280	3.8	28	301	3.8	22	253	2.6	22	275	6.7	30	187	2.7	26	269	2.5	29	114	1.0	29	86	2.5	24	101	1.2	28	273	4.4	19	274	6.8
2,500	30	216	3.3	30	272	3.0	24	289	4.5	26	289	6.2	21	254	3.0	17	273	9.5	30	202	3.1	23	296	3.8	28	139	1.6	27	94	2.6	22	195	0.9	26	270	5.0	19	282	8.8
3,000	30	210	3.0	30	257	4.0	24	291	5.7	23	291	7.2	19	258	3.1	14	276	12.0	30	212	4.6	18	278	4.6	28	118	0.8	27	97	2.8	20	235	2.1	20	268	6.3	17	275	9.3
4,000	30	218	4.1	27	271	3.9	24	282	7.1	18	281	9.1	19	248	3.5	10	278	12.5	30	215	4.3	15	282	6.4	26	317	0.5	24	118	3.2	15	272	3.4	15	279	7.6	12	280	9.2
5,000	30	231	5.0	19	284	6.6	23	280	9.4	14	276	7.6	16	207	2.0				30	218	6.0	13	284	7.4	25	351	1.2	20	128	4.1	13	297	3.6	13	280	10.4	10	280	8.3
6,000	30	244	6.5	15	294	8.2	21	274	9.5	13	276	8.6	15	202	1.7				28	230	6.3	12	283	10.4	25	343	2.3	19	124	4.2	10	267	7.1	10	271	13.9			
8,000	28	255	9.1				17	271	10.5	10	263	8.8	13	189	1.2				27	246	9.2				22	237	3.9	13	90	3.9									
10,000	22	247	11.3				15	254	13.7										27	240	15.2				18	272	5.5	10	97	6.0									
12,000	19	255	14.1				12	251	17.9										23	257	21.4				18	280	5.6												
14,000	16	248	13.4																21	250	21.1				15	287	5.6												
16,000																			16	254	13.3																		

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during September 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°)—Velocities in meters per second*—Continued

Altitude (meters) m. s. l.	Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City S. Dak. (982 m.)			Saint Louis Mo. (181 m.)			Saint Paul, Minn. (225 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (15 m.)			Sault Ste. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	30	273	4.4	30	188	3.9	28	227	1.3	30	65	1.1	29	327	3.3	29	206	1.4	29	251	1.0	30	107	1.7	28	277	4.1	23	273	2.4	30	278	2.4	30	234	1.6	29	318	1.1
500	30	288	2.4	30	186	4.2	28	219	1.5	30	38	0.5	...	...	...	29	212	2.0	29	266	1.6	30	110	2.4	28	296	3.3	23	273	3.5	30	271	1.1	...	...	...	28	306	2.7
1,000	25	312	1.6	30	191	4.5	28	229	2.6	30	256	0.7	29	322	3.3	28	232	2.6	27	250	2.5	30	111	2.4	26	201	1.1	23	267	5.4	25	238	1.0	30	230	1.4	27	295	3.2
1,500	25	290	.6	28	211	5.3	25	237	5.2	30	232	1.1	29	312	4.2	27	243	4.4	21	253	2.6	30	149	2.0	26	170	2.9	21	273	5.9	24	249	1.4	30	232	1.8	27	286	4.2
2,000	25	192	.8	27	231	6.0	23	250	7.7	30	226	2.5	28	303	5.4	26	270	6.1	19	286	4.6	29	163	2.0	26	167	3.7	20	280	7.9	19	187	.7	30	243	2.2	25	283	5.4
2,500	25	189	2.0	25	246	6.8	19	255	10.8	30	219	3.4	26	297	6.0	25	271	7.5	14	291	8 8	25	195	2.4	26	176	4.2	14	290	10.4	16	184	.7	28	273	3.3	24	282	7.1
3,000	25	204	.4	22	268	6.3	17	264	10.7	30	209	3.8	23	299	8.1	23	277	8.4	13	280	10.2	24	211	3.0	26	178	3.9	11	290	11.5	13	235	1.6	25	286	2.9	22	283	8.4
4,000	25	204	.9	21	281	7.2	16	277	12.6	28	205	4.2	19	301	9.9	21	281	9.7	...	...	...	21	212	1.7	25	213	4.2	...	...	...	12	296	.4	22	280	4.5	18	283	9.9
5,000	25	265	3.0	21	275	7.4	14	279	13.6	28	213	4.0	14	289	7.8	17	281	10.7	...	...	...	17	235	2.0	25	231	4.7	...	...	...	...	...	...	20	290	7.2	16	270	12.4
6,000	22	260	2.8	20	279	8.0	14	277	15.6	28	228	5.6	13	286	9.0	15	275	13.3	...	...	...	17	215	1.6	24	249	5.5	...	...	...	...	...	...	16	286	8.8	15	268	13.0
8,000	20	280	6.6	18	288	11.2	10	268	22.4	25	245	8.3	11	276	12.5	...	...	...	...	...	...	13	78	1.6	...	...	...	...	...	...	...	...	...	15	286	9.6	13	260	17.0
10,000	18	283	6.8	17	264	15.3	...	...	...	24	255	15.2	...	...	...	...	...	...	...	...	...	10	102	3.2	...	...	...	...	...	...	...	...	...	11	322	8.6	11	254	21.4
12,000	13	297	7.1	14	263	18.8	...	...	...	19	261	19.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14,000	12	266	10.3	12	263	17.2	...	...	...	11	258	13.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16,000	...	...	...	10	255	13.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

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Altitude (meters) m. s. l.	Joliet, Ill. (178 m.)			Altitude (meters) m. s. l.	Joliet, Ill. (178 m.)		
	Observations	Direction	Velocity		Observations	Direction	Velocity
Surface	31	212	2.2	2,000	25	257	4.8
500	31	227	3.2	2,500	20	272	5.1
1,000	31	240	4.3	3,000	17	279	5.3
1,500	27	246	4.2	4,000	10	299	7.2

TABLE 3.—*Maximum free air wind velocities (m. p. s.), for different sections of the United States based on pilot-balloon observations during September 1942*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast [1]	44.4	SSW	1,000	27	Boston, Mass	50.2	SW	5,000	28	Portland, Maine	76.4	WNW	11,200	8	Caribou, Maine.
East-Central [2]	26.8	WSW	2,040	24	Cincinnati, Ohio	37.0	WSW	5,000	24	Greensboro, N. C	64.8	WSW	10,160	28	Washington, D. C
Southeast [3]	22.5	E	910	29	Atlanta, Ga	28.4	SW	4,530	27	Atlanta, Ga	43.0	ENE	19,380	16	Miami, Fla.
North-Central [4]	37.9	NW	1,200	25	Rapid City, S. Dak	48.2	NW	4,900	28	S. Ste. Marie, Mich	65.0	W	7,870	25	Milwaukee, Wis.
Central [5]	41.8	W	2,500	30	Fort Wayne, Ind	47.5	WNW	4,960	27	Moline, Ill	61.0	WSW	8,630	19	Omaha, Nebr.
South-Central [6]	30.9	SSW	{1,890 1,310	18	Abilene, Tex	32.4	NNW	4,620	27	Tulsa, Okla	{55.0 55.0	SW N	12,570 8,320	15 26	Little Rock, Ark. Oklahoma City, Okla.
Northwest [7]	31.2	N	1,510	25	Billings, Mont	40.8	WNW	3,680	15	Ellensburg, Wash	64.0	SW	10,660	10	Billings, Mont.
West-Central [8]	36.9	SSW	2,500	9	Modena, Utah	59.8	SSW	2,840	9	Modena, Utah	{71.0 71.0	WSW SSW	12,630 10,250	19 9	Denver, Colo. Ely, Nev.
Southwest [9]	24.4	SSW	2,460	9	Las Vegas, Nev	33.8	S	3,900	29	Las Vegas, Nev	60.0	SW	9,300	9	Las Vegas, Nev.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

Precipitation during September was generally well above normal in the central plains states from Texas northward to western Wisconsin. In addition to local flooding that was quite general in this area, local flooding occurred in eastern New York and in the Pecos River in New Mexico, and rather prolonged flooding with high stages in the extreme lower Rio Grande.

Notable among the local floods were the destructive floods in Pierce and Dunn Counties in western Wisconsin. The streams especially affected were the Eau Galle and Red Cedar Rivers, and Spring Valley, Wis., in a narrow flood plain of the Eau Galle River, was severely damaged. These floods resulted from unusually intense rains during the night of September 17–18 over a small area.

Atlantic Slope drainage.—General rains occurred over the entire Atlantic Slope drainage on September 26–27. The amounts were moderate to heavy. A rise resulted in most of the streams and flood stage was reached or exceeded at a few points.

In the upper Hudson River basin rains of 4.5 to 6 inches fell in a 24-hour period and caused some flooding princi-

pally in the smaller tributaries to the upper Hudson River and the Mohawk River. The damage caused was largely to roads and bridges.

The heaviest rain reported in the Schuylkill River Basin during the storm period was 5.85 inches, at Port Clinton, Pa. The river rose 10 feet in less than 24 hours, reaching 14.7 feet at Reading, Pa., on the 28th (flood stage 13 feet). Flood stage was not reached at Pottstown, Pa., the next downstream gaging station.

Sharp rises also occurred in the Lehigh and in the Delaware Rivers. Near-flood stages were reached in the upper Lehigh River on the 27th and in the lower portion on the 28th. The Delaware River did not reach flood stage at any of the gaging stations. Precipitation in the Lehigh Basin averaged about 5 inches, the rainfall occurring in a period of 24 hours or slightly longer.

In the upper Susquehanna River Basin, rises occurred but with only slight overflows in the Chenango River.

Heavy rains in the Carolinas on September 6–7 caused moderate rises in the rivers in the eastern part of the State. Slight overflows were recorded in the Neuse, Broad, and Catawba Rivers.

Upper Mississippi Basin.—Precipitation over much of the upper basin during September was much above normal. Continued rains occurred from the 12th to the 19th. On the 16th a low-pressure system developed over the northern Plains States, advancing into the upper Mississippi Basin by the 17–18th. Moist maritime tropical air over the lower Ohio Valley and the Great Lakes was lifted by a cold wedge of continental polar air in northwestern Wisconsin and resulted in unusually intense rains during the night of the 17th over a small area, especially in the Eau Galle and Red Cedar River watersheds. The most damaging flood occurred in Spring Valley, Wis., in the narrow flood plain of the Eau Galle River, which has a drainage area of only 78 square miles above the flooded town.

In Spring Valley, with about 260 homes, there were only 25 of these that were on high enough ground to escape the destructive effects of the flood. Fortunately no lives were lost. The damages from the flood in Spring Valley and in neighboring areas in Pierce County have been estimated at more than $1,000,000. In 11 other counties in western Wisconsin the damage from floods was estimated at about $500,000, of which about $300,000 resulted from flooding of the Red Cedar River in Dunn County.

Following the heavy rains of the 17–18th, floods developed in the Chippewa River from Chippewa Falls, Wis., to the mouth from the 18–21st, in the Black River, from Melrose, Wis., to the mouth from the 20–22d, and in the Wisconsin River from the 18–26th. On the Minnesota side, bankful stages were reached on the smaller tributaries such as the Root, Whitewater, Zumbro and Cannon Rivers from the 17–19th.

Heavy rainfall in the form of a thunderstorm occurred in the Lockport–Joliet, Ill., area on the night of September 7–8. At Joliet, 5.32 inches of rain was measured, of which 4.80 inches fell between 7:30 p. m. and midnight.

Missouri Basin.—Heavy general rains extended over most of the Republican River watershed and over most of central Kansas on September 2–3. In the Republican River, above bankful stages occurred from above Guide Rock, Nebr., to below Clay Center, Kans. The average depth of rainfall over the entire basin was 3.2 inches. On the morning of the 2d, the rainfall over Frenchman Creek was 5.7 inches and over Medicine Creek, 3.8 inches.

Near record-breaking overflows occurred in the lower Solomon and Smoky Hill Rivers, and in the Saline River at and below Tescott, Kans. These floods resulted from rains, totalling from 5 to 7 inches, that fell in the late afternoon and night of September 2. At Tescott, Kans., the crest of 29.3 was just 0.3 foot below the highest of record in 1935. At Niles, Kans., the crest stage of 30.3 on September 4 was the highest of record except the flood of 1903 which left a high water mark of 32.3 feet.

The flood waters from the Saline and Solomon Rivers produced a crest of 29.6 feet at Enterprise, Kans., in the Smoky Hill, on September 7, exceeded only by the flood of 1903, when the crest from high water marks was 32 feet, and that of October 1941, when the crest was 30.1 feet.

Arkansas Basin.—Slight overflows occurred principally in the upper Neosho River and in portions of the South Canadian River.

Red Basin.—As a result of heavy rains in southwestern Arkansas from September 6 to 9, the upper Ouachita River and the Little Missouri River were in flood for two days. The overflow in the Little Missouri caused considerable damage to matured crops.

West Gulf of Mexico drainage.—Precipitation over the Guadalupe and Nueces River basins for the period September 7–9, averaged about 4.5 inches in the Guadalupe and 5.5 inches in the Nueces. Heavy floods resulted in both streams and although crest stages at gaging points were not as high as the July 1942 flood by 1 to 6 feet, in some sections the overflows exceeded the July flood. This was due to the streams being blocked by trees blown down during the hurricane on the last of August. Damage was greatest to matured crops.

A rather severe flood in the Pecos River, early in September, resulted from extremely heavy precipitation over the basin above Fort Sumner, N. Mex. The rainfall in a 24-hour period in this area amounted to 6.7 inches at Anton Chico, N. Mex., and several other stations reported more than 5 or 6 inches. Twenty stations in the area of heavy rainfall, which extended into the headwaters of the Canadian River, reported the greatest 24-hour amounts of record. Unofficial reports indicate maximum amounts of 8 to 10 inches in the drainage area of the Rio Pintada above Alamogordo Dam.

The most serious damage occurred in the vicinity of Fort Sumner, with total losses in that area estimated at $120,000. Below this area losses amounted to about $45,000.

Due to heavy rains over the Conchos River watershed, in the northwestern part of Mexico, during the last half of August and the first few days of September, a steady and strong rise took place in that river. The Conchos empties into the Rio Grande at Presidio, Tex., and a serious flood developed there. The crest occurred on September 9, when a flow of 60,000 second-feet was observed. The water backed up for about 4 miles above Presidio and prolonged flooding occurred over that section and about 7 miles below Presidio. Damage, mostly to matured crops, has been estimated at more than $300,000.

Rather heavy rains over the Rio Grande watershed north of Del Rio and Laredo, Tex., plus a heavy discharge from upstream, caused a prolonged period of high water in the lower Rio Grande, particularly from Mercedes, Tex., downstream. An all-time high stage of 19.9 feet was reached at Brownsville, Tex., on September 16, 0.2 foot higher than the previous high stage in October 1936. The unusually high stage was probably due to changes in the channel and the fact that the levees were in better

shape on the Mexican side than in the past. Most of the flooding was within the main levees where considerable farming is done. Damage was greatest to crops in the area below Brownsville. The total damage in the extreme lower Rio Grande has been estimated at more than $200,000.

FLOOD-STAGE REPORT FOR SEPTEMBER 1942

[All dates in September unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
	Feet			*Feet*	
Schuylkill: Reading, Pa.	13	27	28	14.7	28
Chenango:					
Sherburne, N. Y.	8	27	27	8.9	27
Greene, N. Y.	8	27	27	8.1	28
Neuse:					
Smithfield, N. C.	13	8	10	14.8	9
Goldsboro, N. C.	14	12	14	14.8	13
Broad: Blairs, S. C.	14	8	8	14.7	8
Catawba: Catawba, S. C.	11	8	8	11.2	8
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Chippewa: Holcombe, Wis.	22	18	21	23.2	19–20
Black: Galesville, Wis.	12	21	21	13.0	21
Wisconsin:					
Merrill, Wis.	11	18	21	13.6	19
Knowlton, Wis.				20.95	19
Wisconsin Rapids, Wis.	12	20	21	12.5	20
Portage, Wis.	17	23	25	18.1	23–24
Missouri Basin					
Solomon:					
Beloit, Kans.	18	4	6	22.25	5
Niles, Kans.	24	4	9	30.3	4
Saline: Tescott, Kans.	25	3	4	29.3	3
Smoky Hill:					
Lindsborg, Kans.	21	3	4	21.8	4
Enterprise, Kans.	26	6	11	29.6	7
Republican:					
Guide Rock, Nebr.	10	3	4	11.2	4
Scandia, Kans.	10	3	5	11.2	4

FLOOD-STAGE REPORT FOR SEPTEMBER 1942—Con.

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
Republican—Continued.	*Feet*			*Feet*	
Concordia, Kans.	8	3	5	8.9	4
Clay Center, Kans.	15	5	6	16.2	5
Kansas: Manhattan, Kans.	17	6	6	17.9	6
		9	9	17.2	9
Arkansas Basin					
Cimarron: Perkins, Okla.	11	Aug. 14	Aug. 14	11.7	Aug. 14
Neosho:					
Burlington, Kans.	23	5	6	26.65	5
Iola, Kans.	15	6	7	17.1	7
Chanute, Kans.	20	7	7	20.0	7
North Canadian: Yukon, Okla.	8			13.0	26
Canadian: Canadian, Tex.	5	5	5	5.6	5
Red Basin					
LittleMissouri: Boughton, Ark.	20	11	12	22.45	11
Ouachita:					
Arkadelphia, Ark.	17	10	11	17.9	10
Camden, Ark.	26	14	16	27.0	15
WEST GULF OF MEXICO DRAINAGE					
East Fork of Trinity: Rockwall, Tex.	10	9	10	10.2	9–10
Guadalupe:					
Gonzales, Tex.	20	9	12	32.2	10
Cuero, Tex.	23	12	13	27.0	12
Victoria, Tex.	21	11	15	28.6	15
Nueces:					
Cotulla, Tex.	15	7	10	17.25	8
Three Rivers, Tex.	37	10	15	39.2	14
Pecos:					
Santa Rosa, N. Mex.	10	1	2	19.9	1
Ft. Sumner, N. Mex.	5	1	2	[1] 15.5	2
Roswell, N. Mex.	15	2	3	[1] 17.4	3
Rio Grande:					
Del Rio, Tex.	15	13	14	15.8	13
Eagle Pass, Tex.	16	14	14	16.1	14
Hidalgo, Tex.	21	11	11	21.0	11
		16	18	21.5	17
Mercedes, Tex.	21	8	20	23.3	12
Brownsville, Tex.	18	9	20	19.9	16

[1] Estimated.

CLIMATOLOGICAL DATA

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW, January 1940, p. 32]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.				
Alabama	73.4	−2.3	2 stations	99	[1]18	2 stations	35	29	4.08	+0.56	Geneva	10.29	Hamilton	1.12
Arizona	72.8	+.1	do	112	[1]15	Alpine	22	30	.82	−.52	Helvetia	3.46	14 stations	.00
Arkansas	71.3	−3.1	Okay	100	12	Gravette	28	27	3.52	+.20	Nashville	9.20	Warren	.35
California	66.9	−.7	Indio	112	15	Boca	18	19	.07	−.38	Forest Glen	1.53	156 stations	.00
Colorado	57.7	−.4	Delta	100	2	Walden	0	19	1.58	+.17	Branson	7.63	Palisade	.11
Florida	80.0	+.6	Cedar Key	103	20	Vernon	45	29	6.75	+.09	Fort Pierce (near)	18.53	Nittaw	1.99
Georgia	74.2	−1.2	Camilla	101	19	Blairsville	32	29	4.61	+1.02	Thomasville	9.23	Dover	2.02
Idaho	58.4	+1.4	Hazelton	103	2	Obsidian (near)	11	20	.54	−.54	Elk City	2.26	4 stations	.00
Illinois	65.7	−2.2	Mount Vernon	98	1	Dixon	22	28	3.05	−.61	Joliet Airport	9.19	Galatia	.20
Indiana	65.2	−2.1	Elliston	98	13	Scottsburg	23	29	2.71	−.58	Winimac	6.10	Seymour	.55
Iowa	61.4	−2.5	2 stations	96	[1]1	2 stations	18	28	4.13	+.30	Maquoketa	7.63	Hawarden	1.73
Kansas	66.6	−3.2	Sublette	100	17	Colby	21	26	4.48	+1.65	Oswego	11.01	Deer Field (near)	.30
Kentucky	67.5	−2.9	Earlington	96	14	Berea	26	29	3.12	+.24	Owensboro	5.30	Uniontown	.64
Louisiana	75.4	−2.6	Lake Providence	98	[1]5	Robeline	34	29	5.09	+1.18	Franklin	16.73	Winnfield	.92
Maryland-Delaware	68.2	+.5	Fort George G. Meade, Md.	95	16	Oakland, Md	19	29	2.99	−.33	Millsboro, Del	5.72	Millington, Md	1.34
Michigan	58.1	−2.3	Monroe	92	14	Watersmeet	9	28	4.69	+1.51	Detour	8.74	Milford	1.72
Minnesota	54.9	−4.3	2 stations	92	[1]1	Grand Rapids	15	28	4.55	+1.68	Farmington	12.68	Hallock	1.02
Mississippi	73.6	−2.3	Clarksdale	98	6	Batesville	32	29	3.38	+.35	Enterprise	7.97	Lake Coromant	.57
Missouri	67.4	−2.0	9 stations	97	[1]12	Marble Hill	22	29	4.19	+.18	Joplin	13.72	Parma	.43
Montana	56.0	+.8	3 stations	100	8	3 stations	13	26	1.13	−.24	Summit	3.60	Haugan	.00
Nebraska	61.1	−3.3	Nenzel (near)	100	10	2 stations	15	26	3.94	+1.86	North Platte-A	8.99	Merriman	.26
Nevada	62.9	+1.7	Overton	106	6	Mala Vista Ranch	13	18	.03	−.40	Lewers Ranch	.45	37 stations	.00
New England	60.7	+.5	2 stations	94	[1]1	Somerset, Vt	20	30	3.68	−.11	Mays Mill, Vt	6.44	Putnam, Conn	1.06
New Jersey	66.1	+.3	Burlington	96	3	Runyon	25	30	4.55	+.76	Long Valley	9.31	Pemberton	.98
New Mexico	63.2	−1.2	Carlsbad	100	17	Eagle Nest	15	23	2.46	+.67	Optimo (near)	9.42	Regina	.26
New York	61.2	.0	Ticonderoga	94	2	Lake Placid Club	22	29	4.98	+1.49	Cairo	10.47	Orient	1.40
North Carolina	71.4	+.4	Mount Gilead	100	18	2 stations	24	[1]28	5.18	+1.26	Highlands	9.51	Clinton	1.19
North Dakota	54.0	−2.8	Bowbells	99	6	Parshall	4	26	1.67	+.11	Hankinson	4.56	Eckman	.37
Ohio	64.6	−1.1	3 stations	94	[1]14	McArthur	24	29	3.18	+.24	Lancaster	6.67	Tipp City	1.41
Oklahoma	71.1	−3.1	2 stations	101	[1]12	Jay	28	27	4.91	+1.76	Miami	11.39	Beaver	1.14
Oregon	59.2	+1.4	3 stations	98	[1]3	Chemult	15	[1]17	.30	−.90	Wickiup Dam	1.50	18 stations	.00
Pennsylvania	63.7	−.5	Phoenixville	96	16	Kane	19	30	4.37	+1.00	Merwinsburg	9.70	Philadelphia	1.68
South Carolina	75.1	+.6	Blackville	103	[1]19	Caesars Head	34	29	3.36	−.64	Landrum	8.39	Rimini	1.10
South Dakota	57.5	−4.1	Hilland	106	10	Ralph	13	26	2.05	+.52	Milbank	6.18	Dupree	.62
Tennessee	69.6	−1.9	Kenton	97	[1]13	Gatlinburg	27	29	2.82	−.14	Fayetteville	7.24	McKenzie	.20
Texas	73.9	−3.4	Center	105	[1]1	Graham	30	27	4.06	+1.17	Dublin	11.40	McCamey	.20
Utah	60.9	+.2	St. George	102	27	Loa	15	19	.55	−.50	Massey's Ranch	1.85	5 stations	.00
Virginia	68.7	+.1	Diamond Springs	98	10	2 stations	23	[1]29	4.39	+1.32	Pinnacles	9.95	Wallaceton	2.15
Washington	61.1	+2.4	Wahluke (near)	102	3	do	22	18	.26	−1.54	Highley Peak	2.74	34 stations	.00
West Virginia	65.1	−1.3	2 stations	98	[1]1	Bayard	15	29	3.97	+1.07	Hastings	8.62	Wardensville	1.43
Wisconsin	57.3	−3.1	3 stations	92	[1]1	Land O'Lakes	12	28	6.40	+2.65	Menominie	14.25	Superior	2.00
Wyoming	54.6	−.2	2 stations	96	[1]6	Pole Mt. Nursery	9	19	1.17	+.01	Sheridan Field Station	2.47	Kemmerer	.07
Alaska (August)	54.3	+1.4	Hyder	91	7	Copper Center	25	24	4.19	+.79	Whittier	24.88	Tanacross	.35
Hawaii	76.0	+1.0	Maine	94	[1]1	Kula Sanatorium	55	18	5.37	−.62	Marsh	36.40	4 stations	.00
Puerto Rico	79.1	+.4	Ponce	97	6	Guineo Reservoir	57	[1]19	6.71	−1.95	Lares	13.37	Ponce	1.93

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
New England	*Ft.*	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	*°F.*	*°F.*	*°F*		*°F.*	*°F.*		*°F.*	*°F.*	*°F*	*°F.*	*%*	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
							60.7	**+1.3**										**84**	**3.14**	**0.0**										**5.3**			
Eastport	75	67	85	29.97	30.05	+0.02	56.9	+1.1	82	1	64	36	29	50	26	53	52	89	3.48	+0.7	14	8.7	s.	29	s.	27	11	5	14	5.8	0.0	0.0	1
Greenville, Me.	1,070	6	41	28.90	30.06	.....	55.4	+3.0	88	1	68	27	29	43	43	51	48	...	4.39	+.5	10	.....	s.	...	...	...	4	11	15	.....	.0	.0	1
Portland, Me.[1]	103	5	36	29.93	30.05	.00	58.9	.....	88	1	69	28	29	48	38	54	52	84	1.28	−1.8	10	7.4	s.	29	se.	27	13	4	13	5.1	.0	.0	1
Concord [2]	289	4	45	29.74	30.06	.00	60.0	+.7	92	2	73	27	30	47	44	55	53	85	5.23	+1.8	13	5.8	nw.	24	se.	27	12	7	11	4.8	.0	.0	2
Burlington [2]	403	11	48	29.59	30.02	−.04	59.2	+1.1	87	2	70	29	29	49	32	54	52	81	4.97	+1.5	10	8.1	s.	38	s.	27	9	6	15	6.0	.0	.0	2
Northfield	876	12	60	29.11	30.06	.00	57.5	+1.4	88	1	70	26	29	45	42	...	...	...	4.93	+1.9	12	7.0	sw.	32	s.	27	9	8	13	6.0	.0	.0	1
Boston [1]	124	33	62	29.92	30.05	−.02	64.6	.....	91	2	72	39	29	57	25	58	55	75	1.96	−1.2	11	10.0	sw.	40	s.	27	11	9	10	5.4	.0	.0	0
Nantucket	12	10	63	30.04	30.05	−.03	63.8	+1.0	85	3	70	43	29	57	21	60	58	89	2.46	.0	6	10.3	ne.	30	ne.	20	11	9	10	5.2	.0	.0	0
Block Island	26	11	46	30.02	30.05	−.03	63.3	−.1	82	3	69	43	29	58	18	60	58	86	1.85	−.8	7	12.9	sw.	34	ne.	21	16	6	8	4.0	.0	.0	0
Providence [2]	159	46	60	29.89	30.06	−.01	65.8	+2.6	93	3	75	36	30	56	32	58	58	83	1.68	−1.5	6	7.3	sw.	31	sw.	27	12	7	11	5.6	.0	.0	0
Hartford [1]	159	5	44	29.88	30.05	−.02	63.7	.....	90	2	74	33	29	53	34	59	57	85	3.24	−.2	12	7.0	sw.	30	s.	27	12	7	11	5.6	.0	.0	0
New Haven [2]	107	74	153	29.95	30.06	−.01	64.8	+1.3	88	2	73	37	30	56	29	60	58	84	2.15	−1.4	8	7.8	n.	28	s.	27	14	5	11	5.2	.0	.0	0
Middle Atlantic States							**68.6**	**+1.5**										**80**	**3.59**	**+0.4**									**5.2**			
Albany [1]	97	26	40	29.94	30.04	−.03	61.6	+.4	90	15	73	30	30	50	35	56	54	83	4.52	+1.7	10	7.4	s.	32	nw.	16	11	7	12	5.4	.0	.0	1
Binghamton	871	57	79	29.14	30.07	.00	62.2	+.9	90	15	73	31	29	51	34	55	53	80	4.39	+1.3	12	5.4	w.	20	w.	27	8	7	15	6.5	.0	.0	2
New York	314	415	454	29.71	30.04	−.04	67.5	+.7	89	3	75	44	29	60	22	60	56	72	3.82	+.4	8	12.2	n.	50	s.	27	14	6	10	4.7	.0	.0	2
Harrisburg [1]	374	30	49	29.66	30.06	−.02	66.6	+.8	94	15	77	35	30	56	32	60	57	80	2.58	−.5	11	6.2	w.	29	s.	27	10	9	11	5.7	.0	.0	1
Philadelphia [2]	114	174	367	29.94	30.06	−.02	69.5	+1.5	93	17	78	43	29	61	25	61	58	79	1.68	−1.5	6	10.4	n.	40	s.	27	11	11	8	4.9	.0	.0	4
Reading	323	47	306	29.71	30.06	.....	66.9	.....	93	15	77	35	30	57	29	...	...	...	3.98	+.8	7	8.7	nw.	37	n.	27	11	7	12	5.1	.0	.0	2
Scranton	805	72	104	29.20	30.06	−.01	63.6	+.7	91	15	74	33	29	53	32	...	...	...	4.59	+1.4	7	5.7	n.	29	nw.	27	9	13	8	5.2	.0	.0	1
Atlantic City	52	37	172	29.99	30.04	−.03	69.4	+2.6	86	3	76	43	29	63	22	64	61	80	3.62	+1.0	11	12.4	s.	43	se.	27	13	5	12	5.7	.0	.0	5
Trenton	190	89	107	29.85	30.05	.....	67.4	+.5	90	17	76	38	29	58	27	61	58	79	2.09	−1.3	9	7.2	n.	31	nw.	27	12	7	11	5.0	.0	.0	3
Baltimore [2]	123	100	215	29.93	30.06	−.02	71.2	+2.7	92	3	80	41	29	62	27	63	59	74	1.82	−1.6	7	8.6	n.	33	nw.	27	12	10	8	5.0	.0	.0	1
Washington [1]	112	62	85	29.99	30.06	−.02	70.4	+2.3	91	9	80	38	30	61	28	64	60	77	2.60	−.6	8	5.6	nw.	28	nw.	27	11	13	6	4.8	.0	.0	2
Cape Henry	18	8	54	30.02	30.04	.....	73.6	+1.8	90	4	80	53	29	68	29	68	66	83	7.04	+4.2	9	11.3	sw.	45	n.	27	8	16	6	5.2	.0	.0	4
Lynchburg	686	144	184	29.34	30.06	−.02	70.6	+1.6	94	9	82	35	29	60	31	63	60	80	5.30	+2.0	11	5.4	w.	30	nw.	27	16	6	8	4.3	.0	.0	4
Norfolk [2]	91	80	125	29.96	30.05	−.01	74.6	+3.0	94	9	82	52	28	67	34	67	65	84	2.83	−.4	8	8.8	ne.	29	n.	28	8	12	10	5.8	.0	.0	5
Richmond [2]	144	11	52	29.90	30.05	−.02	72.0	+1.5	94	9	82	40	29	62	33	65	63	85	3.05	−.2	9	6.5	ne.	35	nw.	10	13	10	7	4.3	.0	.0	3
South Atlantic States							**75.2**	**+1.9**										**82**	**4.27**	**0.0**									**5.2**			
Asheville	2,253	89	104	27.78	30.09	+.02	67.0	+2.0	88	9	78	36	30	56	38	60	58	86	5.39	+2.4	12	5.8	nw.	23	nw.	27	8	12	10	5.9	.0	.0	5
Charlotte [2]	779	63	86	29.24	30.05	−.02	73.2	+1.7	94	18	83	40	29	64	30	65	63	82	4.79	+1.8	9	5.6	sw.	23	sw.	27	11	12	7	5.1	.0	.0	3
Greensboro [1]	886	6	56	29.14	30.07	.....	70.4	.....	92	18	82	35	29	59	35	63	66	81	3.17	.....	6	6.8	ne.	26	s.	27	13	10	7	4.7	.0	.0	3
Hatteras	11	5	50	30.02	30.03	−.03	76.0	+1.5	88	9	82	56	28	70	23	71	70	87	2.64	−2.0	9	10.9	sw.	34	n.	21	10	6	14	5.7	.0	.0	7
Raleigh [1]	376	27	69	29.66	30.05	−.02	73.6	+3.1	96	9	84	39	29	63	33	66	64	82	5.30	+1.7	7	7.2	sw.	25	sw.	27	11	12	7	4.7	.0	.0	4
Wilmington	72	73	107	29.97	30.04	−.01	76.2	+3.1	95	20	85	46	29	68	24	69	67	80	3.89	−.6	8	7.9	sw.	28	s.	27	16	7	7	4.4	.0	.0	3
Charleston [2]	48	11	92	29.98	30.03	−.01	78.0	+1.4	97	20	86	50	29	70	21	70	68	88	5.23	+.7	11	8.9	s.	26	ne.	28	14	8	8	4.7	.0	.0	2
Columbia, S. C.[2]	347	70	91	29.67	30.04	−.01	76.2	+1.7	97	19	86	44	29	66	27	69	67	82	2.66	−.8	8	6.6	ne.	23	ne.	28	13	9	8	5.1	.0	.0	3
Greenville, S. C.[1]	1,040	70	78	28.97	30.05	.....	72.2	+1.6	93	19	82	42	29	62	33	64	61	78	3.50	−.2	10	7.6	ne.	29	ne.	20	8	13	9	5.3	.0	.0	4
Augusta [2]	182	62	77	29.84	30.03	−.02	76.6	+1.3	96	19	87	46	29	66	30	67	64	75	2.70	−.7	7	4.9	nw.	22	nw.	10	14	4	12	4.9	.0	.0	2
Savannah [2]	65	73	152	29.97	30.03	.00	78.8	+2.6	98	19	88	51	30	69	25	70	68	82	2.37	−3.0	8	7.5	s.	24	nw.	10	8	15	7	5.6	.0	.0	5
Jacksonville [2]	43	86	110	29.98	30.03	+.03	79.2	+.9	96	19	88	57	30	71	24	72	71	87	8.47	+1.1	12	6.0	e.	26	w.	27	4	16	10	6.1	.0	.0	7
Florida Peninsula							**82.6**	**+1.9**										**84**	**4.32**	**−2.8**									**6.3**			
Key West [2]	21	10	64	29.94	29.96	+.02	83.4	+1.2	91	22	88	72	25	78	15	78	76	81	2.79	−3.9	13	9.1	e.	25	se.	24	6	21	3	5.1	.0	.0	9
Miami [2]	25	124	168	29.96	29.98	+.01	82.4	+2.3	92	20	88	72	1	77	20	76	75	87	6.25	−2.1	19	8.2	e.	26	ne.	30	4	16	10	6.2	.0	.0	16
Tampa [1]	35	5	61	29.96	30.00	+.03	82.0	+2.1	95	17	89	68	30	75	19	75	73	84	3.93	−2.5	17	8.8	e.	38	s.	25	2	12	16	7.5	.0	.0	15
East Gulf States							**74.8**	**−1.0**										**81**	**5.66**	**+1.5**									**5.1**			
Atlanta [1]	1,173	5	72	28.84	30.04	−.01	72.4	−.4	92	9	83	43	28	62	27	64	62	77	5.73	+2.7	9	6.9	nw.	26	nw.	27	9	12	9	5.6	.0	.0	7
Macon [2]	370	79	87	29.65	30.03	.00	75.2	+.4	96	19	86	46	30	65	33	67	64	76	4.38	+1.2	8	5.6	n.	22	s.	9	7	14	9	5.8	.0	.0	3
Thomasville	273	49	58	29.75	30.04	+.03	76.8	.0	97	19	87	51	28	67	30	...	...	...	9.23	+4.4	9	.....	...	...	...	...	4	12	14	.....	.0	.0	7
Apalachicola	35	11	51	29.96	30.00	.....	77.8	−.7	95	20	84	58	28	71	21	72	70	82	13.14	+5.0	11	7.6	se.	26	sw.	27	9	9	12	5.7	.0	.0	14
Pensacola	56	54	79	29.96	30.02	+.03	76.6	−1.4	94	19	84	50	28	69	26	70	68	79	7.36	+2.0	10	7.2	e.	18	n.	27	12	9	9	4.8	.0	.0	9
Anniston	741	9	...	...	...	...	70.8	−.5	92	9	81	41	28	60	32	...	...	...	3.24	−.4	7	.....	se.	...	...	...	9	17	4	.....	.0	.0	3
Birmingham [2]	700	11	48	29.33	30.06	+.03	72.8	−2.0	94	13	83	42	28	63	33	64	62	83	4.84	+1.5	10	5.7	n.	17	s.	17	11	10	9	5.1	.0	.0	4
Mobile [2]	57	6	30	29.97	30.03	+.03	76.0	−2.1	93	19	84	49	28	68	26	68	66	82	4.98	.0	7	6.6	n.	22	n.	27	11	13	6	5.0	.0	.0	5
Montgomery [2]	218	92	105	29.81	30.04	+.02	75.5	−.8	94	19	85	47	28	66	27	67	64	80	2.44	−.6	5	6.1	n.	20	nw.	27	11	11	8	4.7	.0	.0	4
Meridian [2]	375	67	92	29.65	30.05	+.03	73.0	−1.5	93	10	83	45	29	63	33	66	64	84	5.43	+2.5	8	5.1	ne.	18	e.	4	7	16	7	5.3	.0	.0	8
Vicksburg [2]	247	82	102	29.78	30.03	+.01	74.1	−2.2	92	6	84	41	29	64	33	64	63	86	1.81	−1.1	6	7.8	n.	23	sw.	14	11	14	5	4.8	.0	.0	5
New Orleans [2]	55	76	84	29.96	30.01	+.03	78.2	−1.0	94	12	85	54	29	71	23	70	68	78	5.35	+.3	7	6.3	se.	19	ne.	28	11	15	4	4.4	.0	.0	8
West Gulf States							**75.0**	**−1.9**										**77**	**4.21**	**+0.6**									**5.2**			
Shreveport [1]	249	92	227	29.75	30.02	+.02	74.8	−1.1	92	12	85	43	29	65	38	67	65	79	2.80	.0	6	7.2	se.	29	nw.	26	10	9	11	5.3	.0	.0	4
Bentonville	1,303	12	51	28.69	30.05	+.03	67.4	−1.5	91	13	79	30	27	56	37	...	...	...	5.20	+1.5	10	5.6	s.	17	s.	5	0	29	1	4.1	.0	.0	3
Fort Smith	463	57	82	29.53	30.00	−.01	72.5	−1.5	93	1	82	38	27	63	32	64	60	72	4.13	+1.1	9	6.1	e.	25	nw.	6	13	6	11	4.6	.0	.0	2
Little Rock [2]	357	94	102	29.66	30.04	+.01	72.4	−1.7	93	13	84	37	27	61	36	64	61	78	1.07	−2.1	9	6.5	sw.	26	n.	26	15	7	8	4.4	.0	.0	3
Austin [2]	605	68	90	29.36	29.99	.....	74.6	−3.7	93	2	85	41	27	64	35	68	65	78	8.11	+4.7	7	7.1	s.	42	sw.	3	6	17	7	5.3	.0	.0	6
Brownsville [2]	57	88	96	29.87	29.93	.....	79.8	−.8	95	4	88	55	28	71	27	72	69	79	2.46	−2.4	9	9.1	se.	30	se.	11	3	13	14	6.9	.0	.0	8
Corpus Christi [2]	20	11	78	29.94	29.97	+.02	79.4	−.3	91	1	86	52	27	73	32	72	70	82	3.97	−.5	12	9.5	s.	31	e.	14	8	12	10	5.9	.0	.0	6
Dallas [1]	512	6	46	29.46	30.00	.....	74.0	.....	95	12	85	36	27	63	38	66	62	71	4.61	+1.9	5	8.7	se.	30	s.	18	12	12	6	4.7	.0	.0	2
Fort Worth [1]	679	35	56	29.30	30.00	+.01	74.3	−1.6	94	6	85	40	27	64	35	65	61	72	3.82	+1.3	6	9.0	s.	38	n.	26	12	12	6	4.8	.0	.0	2
Galveston [2]	54	106	114	29.93	29.99	+.01	78.2	−1.9	88	12	83	52	27	74	26	72	70	79	1.86	−3.7	10	9.5	s.	30	n.	26	14	14	2	4.0	.0	.0	3
Houston [2]	138	157	190	29.84	29.99	.....	77.2	−1.8	94	13	86	45	27	69	29	69	67	81	3.28	−.8	10	8.6	se.	28	nw.	26	5	11	14	6.2	.0	.0	6
Palestine	510	64	72	29.50	30.02	+.03	74.0	−3.0	92	13	84	42	27	64	30	66	63	77	3.35	+.4	9	5.7	s.	24	nw.	26	10	12	8	5.0	.0	.0	6
Port Arthur	34	59	134	29.96	29.99	.....	77.2	.....	91	12	84	47	27	70	28	70	68	77	6.57	+1.8	9	11.3	s.	34	ne.	28	5	15	10	5.8	.0	.0	9
San Antonio [1]	693	28	59	29.27	29.98	+.02	75.6	−3.4	93	2	86	41	27	65	34	67	63	73	7.67	+4.6	9	6.4	s.	28	ne.	26	4	14	12	6.1	.0	0	6

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to means of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
Ohio Valley and Tennessee	*Ft.*	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F. 67.3	°F. −0.5	°F		°F	°F		°F	°F	°F	°F	% 81	*In.* 2.80	*In.* −0.2		*Miles*							0–10 5.1	*In.*	*In.*	
Chattanooga [1]	762	21	54	29.26	30.07	+.01	69.6	+1.4	92	19	81	37	29	58	35	63	61	85	3.87	+.8	9	4.7	ne.	24	ne.	28	10	9	11	5.6	.0	.0	4
Knoxville [2]	995	66	84	29.03	30.08	+.02	69.2	−1.4	92	14	81	37	29	58	33	62	60	81	2.82	+.1	9	5.8	ne.	39	w.	9	12	10	8	4.9	.0	.0	3
Memphis [2]	399	78	86	29.62	30.04	+.01	71.8	−1.8	95	13	83	36	29	60	38	63	60	76	.67	−2.1	3	7.0	s.	25	n.	28	14	12	4	3.7	.0	.0	2
Nashville [1]	546	5	72	29.48	30.06	.00	70.1	.....	93	14	81	37	29	59	35	63	60	78	1.82	−1.6	9	7.0	s.	23	s.	26	10	12	8	5.0	.0	.0	3
Lexington [2]	989	6	...	29.03	30.09	+.02	67.4	−1.1	93	14	79	33	28	56	34	...	...	...	2.96	−.5	9	.....	s.	...	...	...	13	12	5	4.4	.0	.0	4
Louisville	525	106	120	29.50	30.06	.00	68.6	−1.9	91	14	78	36	28	59	31	61	58	79	3.55	+.8	8	7.9	sw.	25	sw.	19	10	14	6	5.4	.0	.0	2
Evansville [1]	431	5	38	29.59	30.05	−.01	67.8	+.1	92	13	79	31	28	56	39	60	56	75	1.63	−1.7	7	7.2	s.	27	nw.	23	11	10	9	5.0	.0	.0	3
Indianapolis [2]	823	98	129	29.17	30.05	−.01	66.3	−.6	92	14	76	33	28	57	32	57	55	81	3.46	+.1	8	7.2	s.	25	w.	15	10	11	9	5.2	.0	.0	4
Terre Haute [2]	575	68	149	29.44	30.05	.....	67.2	.....	93	14	77	32	28	58	33	59	56	79	2.04	−1.6	8	8.4	s.	27	nw.	23	12	11	7	4.5	.0	.0	5
Cincinnati [2]	627	11	51	29.39	30.06	−.01	66.4	−.7	91	14	76	32	28	56	35	60	58	82	2.63	.0	10	6.1	s.	19	sw.	9	12	12	6	4.8	.0	.0	5
Columbus [2]	822	90	210	29.20	30.07	.00	66.4	−.1	92	14	76	34	29	56	29	58	55	79	2.83	+.3	10	8.6	s.	29	sw.	9	10	12	8	5.1	.0	.0	2
Dayton [2]	900	186	213	29.11	30.06	.....	65.9	−.7	89	14	75	35	28	57	29	57	54	77	2.81	−.1	9	9.0	sw.	28	nw.	21	8	13	9	5.1	.0	.0	3
Elkins [2]	1,947	61	78	28.07	30.10	+.02	63.5	+.5	88	15	74	26	29	52	40	56	55	93	3.51	+.4	15	4.5	se.	22	nw.	24	5	7	18	6.9	.0	.0	3
Parkersburg	637	77	84	29.39	30.07	−.01	66.7	−.6	90	14	77	32	29	56	34	60	58	83	3.97	+1.2	14	4.6	se.	26	nw.	9	9	14	7	5.1	.6	.0	4
Pittsburgh [1]	842	39	54	29.17	30.07	−.01	64.8	−.2	89	15	75	34	28	55	29	58	55	80	3.40	+.8	13	1	s.	28	nw.	24	6	14	10	5.7	.0	.0	4
Lower Lake Region							62.6	+0.3										80	3.44	+0.5									5.7			
Buffalo [2]	768	243	280	29.21	30.04	−.02	62.0	−.4	82	17	69	37	28	55	29	56	53	79	3.40	+.5	13	13.5	s.	50	w.	24	7	12	11	5.9	.0	.0	1
Canton	448	10	61	29.53	30.00	.....	59.2	−.1	88	18	70	29	29	48	34	54	52	80	4.22	+.9	14	7.3	sw.	28	w.	24	7	11	12	6.4	T	.0	4
Ithaca	836	77	100	.....	.....	.....	61.3	−.3	89	2	72	29	29	50	34	...	...	...	3.54	+.5	14	8.0	nw.	34	se.	27	7	12	11	5.9	.0	.0	2
Oswego	335	71	85	29.66	30.02	−.04	62.5	+1.3	88	17	70	39	30	54	28	56	53	75	3.28	+.6	14	.....	s.	...	...	...	9	10	11	5.7	.0	.0	3
Rochester [1]	523	5	69	29.47	30.03	−.03	62.9	+2.4	90	17	74	31	29	52	32	56	53	81	2.72	+.3	13	8.1	sw.	33	w.	24	6	13	11	6.0	.0	.0	5
Syracuse [1]	596	5	51	29.39	30.03	−.04	62.0	+1.7	90	15	74	32	30	56	34	56	54	81	3.32	+.6	13	8.7	s.	37	w.	27	8	11	11	6.0	.0	.0	2
Erie [2]	714	57	81	29.28	30.05	−.01	65.0	+1.4	88	17	73	40	29	57	29	57	55	83	6.42	+3.0	13	7.5	s.	20	w.	24	7	12	11	5.9	T	.6	2
Cleveland [1]	762	27	54	29.23	30.05	−.01	64.1	+.3	90	14	75	33	29	53	33	57	54	77	3.08	−.2	12	9.3	se.	32	sw.	15	7	12	11	6.0	T	.0	2
Sandusky	629	5	67	.....	.....	.....	65.0	−.3	92	14	75	35	29	55	34	...	...	...	2.13	−.8	12	8.4	sw.	23	sw.	24	10	7	13	5.3	.0	.0	0
Toledo [2]	628	79	87	29.37	30.06	.00	63.4	−1.0	89	14	72	33	28	55	30	56	54	85	2.40	−.4	14	8.1	sw.	26	nw.	19	12	14	4	3.9	T	.0	3
Fort Wayne [1]	857	69	84	29.13	30.05	.....	61.8	−1.3	88	14	72	30	28	51	35	56	54	84	3.81	+.8	13	7.0	sw.	26	nw.	23	9	8	13	5.7	T	.0	3
Detroit [1]	730	5	78	29.26	30.05	−.01	62.6	+.2	89	14	72	32	29	53	28	56	53	77	2.95	.0	14	8.8	s.	33	nw.	24	9	10	11	6.0	.0	.0	0
Upper Lake Region							57.7	−1.7										82	4.07	+0.8									6.6			
Alpena	609	5	89	29.34	30.00	−.03	57.3	−.3	86	1	66	31	29	49	29	53	50	82	3.43	+.4	16	10.3	s.	32	w.	24	5	12	13	6.5	T	.0	4
Escanaba	612	51	72	.....	30.00	−.01	55.2	−1.9	80	10	63	29	28	48	...	...	...	82	5.04	+1.7	17	10.4	s.	30	nw.	24	4	8	18	.....	.3	.0	4
Grand Rapids [2]	707	70	244	29.25	30.01	−.04	62.0	−.7	88	1	70	34	26	54	26	56	53	83	5.22	+1.7	14	9.3	s.	36	sw.	15	6	13	11	6.0	T	.0	3
Lansing [2]	878	5	90	29.09	30.03	.....	59.4	−2.0	83	18	69	29	29	50	28	55	52	83	2.16	−.8	13	7.5	s.	23	sw.	24	6	13	11	6.2	T	.0	1
Marquette	734	44	73	29.18	29.98	−.02	55.3	−2.2	84	11	63	31	26	48	30	50	48	81	5.73	+2.5	19	8.0	nw.	26	s.	21	6	7	17	7.0	2.0	.0	4
Sault Sainte Marie [1]	614	11	43	29.31	29.98	−.04	54.3	−1.2	86	1	63	30	26	48	45	37	50	48	87	5.62	+2.1	16	9.4	e.	36	w.	24	3	7	20	7.5	.6	.0	6
Chicago	673	7	131	29.30	30.03	−.01	62.4	−2.8	90	14	72	29	28	53	29	56	53	81	5.12	+1.9	11	8.1	s.	28	w.	23	5	13	12	6.4	T	.0	5
Green Bay	617	109	141	29.34	30.02	.00	58.0	−2.4	86	1	66	29	28	50	27	52	49	76	3.43	−.1	15	9.9	s.	28	w.	24	6	13	11	6.5	T	.0	3
Milwaukee [1]	681	33	66	29.28	30.02	−.01	59.6	−1.4	88	1	68	28	28	51	29	54	52	82	3.43	+.1	14	10.4	sw.	39	sw.	15	8	10	12	6.2	T	.0	6
Duluth	1,133	5	47	28.77	30.00	+.02	53	3	−1.8	77	1	62	26	25	45	27	47	45	84	1.50	−1.8	9	11.2	ne.	44	nw.	23	4	8	18	7.2	T	.0	2
North Dakota							54.4	−2.6										72	1.51	−0.1									5.2			
Fargo [1]	940	5	43	28.98	30.00	+.04	54.2	−4.0	85	10	65	20	28	43	36	49	46	78	1.27	−1.0	11	11.9	s.	46	nw.	23	9	9	12	5.8	.6	.0	3
Bismarck [1]	1,677	4	41	28.22	30.00	+.06	55.2	−2.1	95	10	68	16	26	43	38	48	44	71	2.08	+.8	11	10.1	se.	34	nw.	21	13	6	11	5.1	4.1	.0	5
Devils Lake	1,478	11	44	28.41	29.98	+.04	52.7	−3.2	86	8	64	21	26	42	39	47	44	77	1.15	−.5	10	8.1	s.	28	se.	10	10	8	12	5.2	T	.0	2
Lemmon, S. Dak	2,602	4	38	27.29	30.00	.....	55.3	.....	92	8	68	18	26	43	39	48	42	69	2.08	.....	11	.....	s.	...	...	...	12	5	13	...	T	.0	6
Grand Forks	832	11	71	29.09	30.00	.....	54.0	.....	85	6	66	18	26	42	37	47	44	...	.72	.....	9	.....	s.	...	...	...	9	10	11	...	T	.0	4
Williston	1,878	42	50	28.01	29.98	+.05	55.4	−1.2	94	8	67	21	27	44	43	47	42	67	1.53	+.4	10	6.5	se.	31	nw.	10	12	9	9	4.9	2.6	.0	0
Upper Mississippi Valley							64.0	−1.7										78	4.20	+0.5									5.9			
Minneapolis-St. Paul, Minn. [1]	919	32	61	29.00	29.99	.00	57.2	.....	90	11	66	26	28	48	31	52	49	78	7.53	+4.4	9	9.6	se.	35	nw.	1	6	7	17	6.8	1.7	.0	4
Springfield, Minn	1,025	4	42	28.90	30.00	.....	57.6	.....	89	11	68	23	28	48	35	52	48	78	5.70	.....	14	.....	se.	...	...	...	8	10	12	...	3.0	.0	5
La Crosse [2]	714	11	48	29.23	30.00	−.01	58.8	−3.4	85	11	67	27	28	50	28	54	51	81	6.86	+2.9	15	4.7	s.	20	s.	17	7	7	16	6.9	.2	.0	7
Madison [2]	974	70	78	28.98	30.02	−.01	60.0	−2.4	88	1	68	30	25	52	27	54	52	83	5.76	+2.0	16	7.2	sw.	20	w.	23	5	10	15	6.9	T	.0	6
Charles City	1,015	10	51	28.93	30.02	+.02	58.4	−2.6	88	11	68	23	28	49	31	54	51	82	3.61	−.1	14	5.7	se.	19	sw.	21	10	7	13	6.0	.4	.0	7
Davenport [2]	606	66	161	29.37	30.03	.00	64.3	−1.3	91	1	73	30	28	56	26	57	54	78	4.22	+.6	16	8.6	sw.	29	sw.	16	6	12	12	6.3	T	.0	7
Des Moines [2]	860	5	99	29.08	30.00	−.02	63.0	−2.6	90	11	72	28	28	54	32	56	53	79	3.03	−.6	10	8.9	n.	27	nw.	21	10	9	11	5.8	.3	.0	6
Dubuque	699	60	79	29.27	30.01	−.02	61.3	−2.7	90	1	70	29	28	53	28	56	52	78	3.82	−.2	15	5.5	s.	18	nw.	23	6	8	16	6.6	T	.0	6
Burlington, Ia.	702	6	35	29.26	30.01	−.02	64.4	−3.0	92	2	74	25	28	55	32	57	54	79	4.85	+.4	15	8.0	s.	24	nw.	23	8	10	12	6.0	1.2	.0	6
Cairo	358	87	93	29.67	30.05	.00	71.2	−.3	92	13	81	39	28	61	30	...	...	...	.96	−1.9	5	7.3	sw.	24	nw.	19	13	6	11	4.8	.0	.0	5
Peoria [2]	609	11	45	29.38	30.03	−.01	64.8	+.5	92	18	75	24	28	55	32	58	55	80	3.34	−.7	12	4.2	s.	17	sw.	30	11	10	9	5.5	1.0	.0	4
Springfield, Ill. [2]	636	5	191	29.36	30.04	−.01	67.6	.0	95	14	77	33	28	58	36	58	55	79	4.45	+.8	7	10.2	s.	33	n.	23	9	10	11	5.8	T	.0	6
St. Louis [1]	568	179	303	29.43	30.04	.00	69.7	−.8	94	12	79	36	28	61	34	60	54	65	1.99	−1.5	6	10.9	sw.	30	sw.	7	16	7	7	3.8	.0	.0	3
Missouri Valley							62.8	−2.7										77	4.22	+1.0									5.6			
Columbia, Mo. [2]	784	6	66	29.19	30.02	−.01	67.6	−.6	93	2	77	33	27	58	32	59	56	77	4.57	+.2	11	6.5	s.	18	nw.	23	9	12	9	5.1	.0	.0	3
Kansas City [1]	963	38	76	28.99	30.01	−.01	67.7	.....	95	1	77	34	27	59	32	60	57	74	3.15	−1.4	11	10.5	sw.	40	nw.	18	10	10	10	5.4	.0	.0	4
St. Joseph [2]	967	11	49	28.98	30.00	.....	66.0	−2.4	92	14	75	33	27	57	32	60	58	84	6.50	+2.6	11	8.1	s.	25	nw.	26	12	6	12	5.4	.0	.0	5
Springfield, Mo. [1]	1,324	5	60	28.65	30.04	+.01	67.2	.....	90	2	78	30	27	57	32	59	57	80	4.53	+1.0	7	9.0	se.	26	s.	18	12	10	8	4.9	.0	.0	3
Topeka	987	65	87	28.96	30.00	.....	67.5	−1.2	95	14	78	33	27	57	35	60	56	77	6.86	+3.0	10	8.7	s.	24	s.	29	11	10	9	5.1	.0	.0	7
Lincoln [2]	1,189	11	81	28.73	29.98	−.01	64.0	−2.4	91	11	74	30	28	54	37	57	54	76	5.00	+2.0	13	8.8	s.	35	sw.	14	7	8	15	6.3	.0	.0	2
Omaha [1]	1,105	31	44	28.83	30.00	.00	63.0	−2.7	92	1	72	30	28	54	31	57	53	78	3.84	+.6	12	11.0	s.	35	nw.	23	6	8	16	6.6	.0	.0	7
Valentine	2,598	46	54	27.30	30.01	+.05	57.8	−4.7	98	10	71	25	26	44	49	49	43	65	.86	−.4	6	8.3	s.	38	nw.	25	10	8	12	5.4	.2	.0	3
Sioux City [1]	1,138	5	27	28.79	30.00	+.02	59.7	−2.8	93	1	70	25	28	49	39	54	51	79	4.01	+1.0	9	8.5	se.	41	se.	11	8	5	17	6.3	T	.0	5
Huron [1]	1,301	5	41	28.61	30.00	+.04	56.4	−4.9	96	10	68	25	24	45	40	51	48	80	2.92	+1.4	9	11.5	s.	39	nw.	23	11	8	11	5.3	T	.0	6
Northern Slope							58.2	+0.5										61	1.18	+0.6									5.3			
Billings [1]	3,570	18	39	26.34	29.97	.....	58.8	−1.4	91	6	71	29	26	47	38	49	41	59	1.66	.....	9	10.6	sw.	40	n.	25	9	9	12	5.7	.3	.0	1
Havre	2,507	11	67	27.37	29.99	+.05	57.6	+1.2	91	5	71	30	27	44	45	48	40	61	.95	−.3	7	7.6	sw.	30	nw.	15	11	8	11	5.5	T	.0	5
Helena [1]	4,124	5	35	25.84	30.01	+.04	56.0	+.6	87	8	70	28	26	42	47	40	38	58	.66	−.6	3	8.2	w.	47	w.	9	7	13	10	5.7	.1	.0	3
Missoula [2]	3,205	80	91	26.66	30.01	.....	60.2	+4.8	91	4	74	37	18	46	40	49	42	60	1.51	+.1	6	6.2	e.	33	e.	1	14	10	6	4.1	.0	.0	5
Kalispell	2,973	48	56	26.95	29.98	+.02	56.0	+2.5	83	5	69	31	18	43	35	49	42	63	.31	−.9	4	5.5	w.	22	w.	5	11	9	10	5.3	.0	.0	4
Miles City [2]	2,371	48	55	27.50	29.98	+.03	59.3	−1.9	95	8	72	22	26	47	42	49	42	62	.78	−.3	11	5.9	nw.	27	nw.	25	11	10	9	5.4	T	.0	1
Rapid City [2]	3,259	50	58	26.66	30.00	+.04	57.4	−3.0	97	10	71	18	26	44	42	48	40	61	1.74	+.5	11	13.4	nw.	66	nw.	25	9	10	11	5.1	.5	.0	2
Cheyenne [1]	6,094	5	39	24.07	29.98	+.02	55.3	.....	83	9	70	18	19	41	45	45	38	60	1.70	+.5	6	10.4	w.	42	n.	25	9	14	7	5.1	4.8	.0	2
Lander	5,352	60	68	24.71	29.97	+.01	56.9	+1.2	84	8	71	26	26	43	45	46	38	56	1.69	+.8	5	5.2	sw.	32	w.	9	11	11	8	4.7	1.7	.0	0
Sheridan [2]	3,790	6	42	26.13	29.97	.....	58.7	+2.4	92	8	72	28	6	45	43	48	39	58	1.71	+.4	10	9.0	nw.	37	nw.	25	8	7	15	6.3	.6	.0	2
North Platte [2]	2,821	11	51	27.08	29.98	+.01	60.8	−1.3	92	30	73	27	26	49	50	53	49	74	7.54	+6.2	8	7.0	s.	34	ne.	1	13	6	11	5.0	.0	.0	3

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to means of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max.+mean min.÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	*°F.*	*° F.*	*° F*		*° F*	*° F*		*° F*	*° F*	*° F*	*° F.*	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
Middle Slope							66.3	−2.3										69	3.83	+1.6										4.4			
Denver [1]	5,292	106	113	24.79	29.96	.00	61.2	−.4	90	9	74	29	25	48	38	48	38	53	.69	−.3	7	7.1	s.	26	nw.	6	16	7	7	3.9	.3	.0	1
Pueblo [1]	4,690	5	36	25.33	29.95	−.01	62.3	−2.3	92	10	78	33	26	47	50	51	44	61	1.76	+1.0	5	7.1	se.	33	ne.	25	15	8	7	4.0	.0	.0	3
Concordia	1,392	50	58	28.54	30.00	+.01	65.2	−3.1	91	17	75	33	28	56	36	58	54	74	4.30	+1.7	7	8.2	s.	21	nw.	26	10	9	11	5.4	.0	.0	5
Dodge City [1]	2,509	10	86	27.40	29.96	−.02	67.0	−2.4	97	17	80	31	26	54	39	56	50	65	1.33	−.6	7	15.8	s.	49	n.	26	15	7	8	4.3	.0	.0	6
Wichita [1]	1,358	6	64	28.58	30.00	.00	67.5	−3.1	91	13	78	32	27	57	36	60	56	77	7.21	+4.1	13	13.8	s.	37	s.	17	15	6	9	4.5	T	.0	7
Oklahoma City [2]	1,214	10	47	28.73	29.99	.00	70.4	−2.4	91	13	81	38	27	60	35	62	59	74	6.73	+3.7	10	8.5	s.	26	nw.	26	15	6	9	4.1	.0	.0	5
Tulsa							70.3	−2.6	93	12	80	35	27	60	33	63	60	77	4.82	+1.8	11	9.7	s.	36	n.	26	11	11	8		.0	.0	5
Southern Slope							71.0	−2.5										69	2.56	0.0									5.2			
Abilene [3]	1,738	10	56	28.20	29.97	+.01	73.2	−2.1	93	6	85	39	27	62	41	63	59	73	2.35	−.4	4	8.5	s.	23	n.	26	15	10	5	4.1	.0	.0	4
Amarillo [3]	3,676	10	49	26.30	29.96	.00	66.5	−2.8	94	17	79	39	26	54	38	57	52	68	1.45	−.8	6	15.0	s.	58	ne.	25	18	5	7	3.6	.0	.0	4
Del Rio	960	63	71	28.97	29.94	.00	75.4	−3.8	92	5	84	45	27	66	35	67	63	71	3.96	+1.0	5	8.3	se.	29	w.	19	7	16	7	5.5	.0	.0	3
Roswell	3,566	75	85	26.40	29.96	+.04	69.0	−1.3	94	17	82	39	27	56	39	58	52	63	2.50	+.4	6	6.8	s.	34	ne.	25	19	6	5	3.5	.0	.0	4
Southern Plateau							76.3	+1.1										41	0.78	0 0									2.1			
El Paso [3]	3,778	82	101	26.18	29.88	.00	73.5	−.4	93	17	86	50	27	62	32	59	51	54	1.03	−.2	7	7.5	e.	26	sw.	10	15	10	5	3.4	.0	.0	7
Albuquerque [1]	5,314	5	45	24.78	29.88	.....	68.6	+.7	89	1	81	45	30	56	34	54	43	47	1.55	+.7	5	8.7	se.	38	e.	24	17	10	3	3.0	.0	.0	6
Flagstaff	6,907	10	59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phoenix [3]	1,107	39	87	28.64	29.76	−.05	85.2	+2.5	105	3	100	62	12	70	39	63	50	38	.21	−.5	2	5.5	e.	23	e.	10	25	5	0	1.5	.0	.0	5
Tucson [1]	2,555	5	23	27.26	29.80	.....	81.6	.....	102	2	96	62	7	68	36	62	50	40	1.78	+.6	6	.....	se.	.....	.....	.....	21	5	4	2.5	.0	.0	4
Yuma	142	9	54	29.60	29.74	−.04	84.8	+1.1	111	15	103	60	12	66	46	64	50	38	.00	−.4	0	4.4	w.	16	n.	27	30	0	0	.1	.0	.0	0
Independence	3,957	5	26	29.95	29.93	+.07	69.4	+1.4	92	15	86	44	20	52	41	50	31	28	.12	.0	1	.....	n.	.....	.....	.....	.....	.....	.....	.....	.0	.0	0
Middle Plateau							62.5	+0.8										36	0.12	−0.5									2.1			
Reno [3]	4,527	61	76	25.47	29.96	+.01	60.4	−.1	92	15	84	27	19	37	57	46	34	49	.02	−.2	1	5.6	w.	34	w.	8	25	4	1	1.7	.0	.0	1
Tonopah	6,090	9	20	24.07	29.90	.....	64.6	.....	83	15	76	38	18	53	34	47	29	30	T	.....	0	.....	nw.	.....	.....	.....	27	3	0	.....	.0	.0	0
Winnemucca	4,339	5	56	25.62	29.94	+.01	61.0	+1.8	92	4	82	29	20	40	54	44	27	33	.02	−.4	1	6.7	ne.	20	w.	8	28	3	1	1.3	.0	.0	0
Modena	5,473	10	46	.....	29.92	.00	59.8	−.2	86	15	80	60	18	40	.....	.....	.....	28	T	−.8	0	10.2	w.	35	s.	9	26	3	1	.....	.0	.0	2
Salt Lake City [1]	4,227	86	47	25.61	29.91	−.04	64.2	+1.5	92	2	79	32	19	49	40	49	35	39	.13	−.8	2	9.8	se.	34	sw.	9	22	5	3	2.8	.0	.0	3
Grand Junction	4,602	60	68	25.39	29.93	−.02	67.1	+.9	92	1	82	38	19	52	38	50	35	37	.41	−.5	4	6.4	se.	24	sw.	9	20	7	3	2.6	.0	.0	3
Northern Plateau							63.4	+3.3										48	0.37	−0.4									3.6			
Baker [3]	3,471	36	54	26.46	30.00	+.01	59.4	+3.4	91	2	77	31	18	42	45	46	37	60	.34	−.4	1	5.9	s.	17	n.	17	17	9	4	3.6	.0	.0	1
Boise [1]	2,739	5	49	27.13	29.93	−.04	63.2	+2.0	95	2	79	34	18	48	40	50	37	42	.01	−.5	1	8.7	nw.	31	sw.	9	21	6	3	2.8	.0	.0	2
Pocatello [1]	4,478	5	31	25.48	29.94	−.02	60.8	+1.5	92	2	77	31	19	45	48	46	32	41	1.63	+.9	3	9.7	sw.	32	sw.	8	16	11	3	3.5	.0	.0	2
Spokane [1]	1,929	27	42	27.95	29.96	−.02	61.8	+2.6	90	4	78	32	18	46	41	51	41	51	.22	−.7	2	6.0	n.	26	n.	15	15	9	6	3.8	.0	.0	0
Walla Walla	991	57	65	28.91	29.96	−.04	67.9	+4.1	93	4	81	41	18	55	35	.....	.....	.....	.04	−.9	2	5.2	s.	21	sw.	15	17	7	6	3.7	.0	.0	0
Yakima	1,076	58	67	28.83	29.97	.....	67.4	+6.3	94	4	82	40	19	53	40	54	42	45	T	−.5	0	5.6	nw.	21	nw.	15	14	13	3	4.1	.0	.0	0
North Pacific Coast Region							60.6	+2.3										72	0.41	−1.8									4.9			
North Head	211	5	56	29.82	30.05	+.02	57.0	+.5	81	21	62	47	21	52	34	54	52	88	.52	−2.5	11	10.7	n.	36	s.	30	6	8	16	7.2	.0	.0	0
Seattle [3]	125	90	321	29.90	30.03	+.02	61.4	+3.3	80	22	70	46	18	53	28	55	51	74	.27	−1.5	3	6.3	n.	21	s.	5	10	7	13	5.5	.0	.0	0
Tacoma	194	172	201	29.84	30.04	+.02	60.4	+3.1	78	23	69	44	18	52	27	.....	.....	.....	.19	−1.9	4	5.9	n.	22	sw.	14	8	13	9	5.6	.0	.0	0
Tatoosh Island	86	9	61	29.96	30.06	+.05	54.4	+1.4	74	22	59	45	20	50	23	52	50	89	1.54	−3.1	6	10.1	s.	32	s.	30	8	4	18	6.5	.0	.0	0
Medford [1]	1,329	29	58	28.59	29.97	.....	66.3	.....	98	23	84	39	17	48	51	53	42	49	.16	−.4	2	.....	nw.	.....	.....	.....	22	5	3	2.5	.0	.0	3
Portland, Oreg. [3]	154	68	106	29.85	30.02	−.01	65.5	+3.8	91	22	76	49	16	55	33	56	51	67	.09	−1.9	2	4.9	nw.	16	w.	9	14	10	6	3.7	.0	.0	1
Roseburg	510	45	76	29.47	30.01	−.01	64.7	+1.8	95	22	80	39	18	49	49	55	48	62	.09	−1.2	1	3.7	Di.	22	n.	18	18	7	5	3.0	.0	.0	1
Middle Pacific Coast Region							65.2	+0.3										65	0.09	−0.6									3.7			
Eureka	60	72	88	29.96	30.02	+.01	55.5	−.4	69	18	60	44	20	51	23	52	50	86	.06	−1.0	3	5.7	n.	30	n.	17	8	8	14	6.2	.0	.0	0
Redding	722	20	34	29.14	29.90	.....	75.0	+1.5	101	15	88	55	9	62	36	57	42	36	.10	−.7	2	8.1	nw.	26	ne.	17	20	8	2	2.2	.0	.0	1
Sacramento [3]	66	92	115	29.82	29.88	−.01	70.0	+.7	100	15	84	51	26	56	36	58	49	55	.03	−.4	1	6.9	s.	21	n.	18	26	3	1	1.6	.0	.0	0
San Francisco	155	112	132	29.77	29.94	.00	60.2	−.7	93	14	66	53	13	55	39	56	53	83	.18	−.3	1	9.7	w.	25	w.	7	12	9	9	4.9	.0	.0	0
South Pacific Coast Region							69.3	−0.4										65	T	−0.2									2.4			
Fresno [1]	327	5	35	29.52	29.87	.00	72.4	+.4	101	16	88	53	26	56	40	59	48	49	.00	−.2	0	6.1	nw.	18	nw.	8	28	1	1	.8	.0	.0	0
Los Angeles	338	223	250	29.53	29.89	+.01	67.8	−1.2	91	21	78	54	7	58	28	59	55	71	T	−.2	0	5.4	w.	17	w.	19	18	12	0	2.9	.0	.0	0
San Diego [1]	87	20	55	29.80	29.89	.00	67.8	−.4	83	22	75	56	19	61	25	62	59	75	.00	−.1	0	6.5	w.	17	w.	20	16	11	3	3.6	.0	.0	0
West Indies																																	
San Juan, P. R.	82	10	54	29.86	29.94	.....	80.7	+.2	93	29	86	70	1	75	18	76	74	81	4.21	−1.7	13	8.8	e.	28	e.	16	4	18	8	5.9	.0	.0	11
Panama Canal																																	
Balboa Heights	118	6	92	.....	[4]29.84	+.02	80.1	+.3	91	7	86	71	16	74	19	.....	.....	[5]90	8.11	−.2	20	4.9	nw.	23	ne.	16	0	16	14	7.4	.0	.0	4
Cristobal	27	47	97	.....	[4]29.83	.00	81.6	+1.2	90	19	87	72	27	76	15	76	75	[5]87	21.62	+8.8	25	5.1	sw.	24	n.	27	0	4	26	8.8	.0	.0	13
Alaska																																	
Fairbanks	484	11	87	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Juneau	80	96	116	.....	[4]30.03	.....	53.1	+2.6	74	2	59	38	17	47	...	50	47	83	8.39	−1.7	16	4.6	s.	28	se.	11	5	5	20	.....	.0	.0	0
Hawaiian Islands																																	
Honolulu	38	86	100	29.92	29.97	.....	79.0	+.8	85	16	84	73	20	74	12	...	.....	.....	.99	−.3	9	8.1	ne.	23	ne.	9	8	15	7	5.4	.0	.0	0

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken hourly.
[4] Pressure not reduced to a mean of 24 hours.
[5] Barometric data from airport; other data from city office records.
[6] Wind, clear, partly cloudy and cloudy data from city office records; other data from airport.

NOTE.—Except as indicated by notes, 1, 2, 5 and 6 data in table are city office records.

SEVERE LOCAL STORMS, SEPTEMBER 1942

[Compiled by Mary O. Souder]

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
North Fork of Milk River, Glacier County, Mont.	9	5 p. m.	2,640		$20,000	Heavy hail	Storm moved from southwest to northeast with loss in wheat and flax; path 5 miles long.
Yellow Medicine, Chippewa, Kandiyohi, Meeker, Wright, Sherburne, Isanti, Anoka, Hennepin, and Chisago Counties, Minn.	11	3:30–7 p. m.	[1] 30	5	2,300,840	Thundersqualls	About 651 barns, 2 houses and 1,208 outbuildings demolished; 618 barns, 1,769 houses, and 1,615 buildings damaged; 375 cattle, 75 horses, and several hundred sheep and hogs, and thousands of poultry killed with many others injured, some fatally. Many silos, windmills, garages, and much farm machinery wrecked; more than 748 poles down; many airplanes and gliders wrecked or damaged. Number of oil tanks torn from concrete bases; potato warehouses, lumberyard, stores, buildings and churches destroyed or damaged. A railroad signal tower blown over resulting in derailment of a freight train; hundreds of trees uprooted; 37 persons injured. Many haystacks scattered and growing crops damaged severely, especially corn which was badly lodged with some uprooted.
Spooner, Wis.	11				4,000	Wind	Several overnight cabins wrecked; few barns and smaller buildings damaged, and several trees blown over.
La Grange County, Ind.	14	4 p. m.	[1] 1		2,000	do	Buildings and trees damaged.
Hill City and Stockton, Kans., and vicinity.	14	5:10–5:30 p. m.	[1] 6		60,000	Wind and hail	Path extended from north of Hill City to about 5 miles southwest of Stockton, and was 30 miles long. Barns, granaries, and other farm property damaged by wind. 10 persons injured. Damage from hail, $5,000; from wind, $55,000.
Pope and Stearns Counties, Minn.	14	9:30 p. m.	[1] 4		30,000	Thundersqualls, heavy rain and hail.	Number of barns, outbuildings, and silos damaged. The general direction of the storm was from northwest to southeast, over a path about 20 miles long.
Hudson, N. Y.	15				8,000	Wind, electrical	Wind caused thousands of dollars' loss in apple crop, not estimated. Barn with contents burned, loss $8,000.
Jefferson and Lewis Counties, N. Y.	15–16				5,000	Electrical, wind and rain.	Trees uprooted; fields of corn flattened. Large barn burned with an estimated loss of $5,000.
Forest Lake and White Bear Lake, Minn., and vicinity.	16	3:40 p. m.	[1] 10		25,000	Thundersquall and hail.	A number of lake cottages, garages, and about 12 airplanes damaged; poles and wires down and trees uprooted. Property damaged, $20,000; loss to growing crops, $5,000. Path from southwest to northeast and about 25 miles long.
Spooner to Stone Lake, Wis.	16	4 p. m.			1,000	Hail	Crops generally mature, but much loss in gardens and damage to roofs and windows.
Hill County, Mont.	16	6 p. m.	[1] 4		10,000	Wind and hail	Loss in wheat, barley, flax and mustard; path 10 miles long.
Stanley, Wis., vicinity of	16	do	50	0		Tornado	Storm originated about 1 mile south of Stanley, moving northeastward over a path about 1½ miles long. No buildings were in the path of the storm, but a few trees were uprooted and corn fields flattened. Only minor loss estimated.
Somerset, Wis.	16				3,000	Wind	Property damaged.
Spooner, Wis.	16				3,000	do	2 barns and several smaller buildings damaged.
Turtle Lake, Wis.	16				2,000	do	Shingles blown from roofs, garage doors wrecked, trees blown over, windows broken, and some smaller buildings damaged.
Chisago City, Minn.	17	6:30 p. m.			1,500	Electrical	Barn burned.
Edson, Wis.	17	11:30 p. m.	100		20,000	Tornado	Several houses and barns and a school damaged; silo and garage wrecked path 1½ miles long.
Dakota and Scott Counties, Minn.	17–18				100,000	Rain and flood	Heavy to excessive rains resulted in Sand Creek, near Jordan, Minn., overflowing its banks. Railroad tracks washed out, highways and roads inundated and basements and streets flooded. Lowlands under water with loss in hay and growing crops.
West-central Counties, Minn.	25–26	P. m. and a. m.			25,000	Sleet, snow, and wind.	Many poles down as a result of high winds and the freezing of heavy, moist snow on the wires. Communications and electric services disrupted. Damage to trees and shrubbery and much loss in corn and millet; traffic delayed. At Bird Island 8 inches of snow fell, it being the heaviest ever recorded in this portion of the State in September.
Carysbrook, Va.	27	3:30 p. m.	500	0		Tornado	Damage mostly to farm buildings and crops. This section is not thickly settled.

[1] Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR SEPTEMBER 1942

[Solar Radiation Investigations Section, I. F. HAND in charge]

SOLAR RADIATION OBSERVATIONS

Explanations of the tables and references to descriptions of instruments, stations and methods of observation, and to summaries of data, are given in the January 1942 REVIEW, p. 20.

Beginning with this issue, total solar and sky radiation data from Davis, Calif., will appear regularly in table 2 through the courtesy of Professor F. J. Veihmeyer of the University of California Agricultural Experiment Station. Dr. Veihmeyer's radiation equipment consists of a 10-junction Eppley thermoelectric pyrheliometer 659, having a resistance of 35 ohms and generating approximately 1.5 millivolts per gram-calories per square centimeter.

The records are made on a Leeds & Northrup Model S Micromax integrating potentiometer 463899. This instrument has been modified so that full scale deflection represents two gram-calories.

The coordinates of the new station are as follows:

Latitude 38°32′ N., longitude 121°45′ W., the elevation above sea level 32.4 feet.

TABLE 1.—*Solar radiation intensities during September 1942*

[Gram-calories per minute per square centimeter of normal surface]

Albuquerque, N. M.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.				P. M.					Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Sept. 1	9.47				1.20	1.41	1.22	1.06		0.86	10.21
Sept. 2	11.38	0.88	0.98	1.10	1.26	1.38	1.21	1.01	0.87	.76	11.38
Sept. 3	10.21	.80	.88	1.00	1.12						10.97
Sept. 5	9.14	.94	1.03	1.12	1.27	1.47					7.87
Sept. 6	8.48			1.03		1.47					7.87
Sept. 7	7.04	.86	.96	1.06	1.22	1.42	1.21	1.06	.94	.82	7.57
Sept. 8	7.04	.81	.92	1.02	1.18	1.42	1.26	1.07	.96	.83	8.18
Sept. 9	6.50					1.50	1.30	1.14	1.02	.93	8.48
Sept. 10	7.04	.81	.90	.99	1.18	1.45	1.18	1.05			9.47
Sept. 12	11.81					1.45					12.68
Sept. 13	11.38					1.45			.96	.96	10.59
Sept. 14	10.97	.87	.97								11.38
Sept. 15	9.47		1.03		1.29	1.53	1.33	1.21	1.09	.98	7.04
Sept. 16	7.57		1.01	1.14	1.30	1.52	1.26	1.08	.96	.88	7.04
Sept. 17	7.57		.92	1.06	1.22	1.42	1.21	1.02	.89	.82	6.76
Sept. 19	6.50						1.20	1.04	.91	.81	8.18
Sept. 20	6.50		.92	1.05	1.24	1.44	1.22	1.07	.94	.82	7.29
Sept. 21	8.81					1.42	1.22	1.11	.95	.84	9.14
Sept. 22	6.02			1.04		1.43	1.27	1.12	1.00	.88	7.87
Sept. 23	7.87						1.30	1.15	1.05	1.00	4.95
Sept. 24	6.27	.77	.88	1.02	1.19	1.45	1.14	1.00	.85	.74	6.76
Sept. 25	7.87		.98	1.13	1.29	1.49					4.37
Sept. 26	5.16				1.24	1.50	1.30	1.12	1.01	.90	4.17
Sept. 27	4.75		.99	1.13	1.28	1.51	1.31	1.14	.99	.86	4.95

[1] Light amount of dust in air.

TABLE 1.—*Solar radiation intensities during September 1942*—Continued

Albuquerque, N. M.—Continued

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.				P. M.					Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Sept. 28	3.63				1.25	1.53	1.33	1.21	1.12	1.01	4.57
Sept. 29	4.17		1.13	1.16	1.35	1.57	1.36	1.23	1.12	1.03	3.99
Sept. 30	3.81	.98	1.07	1.19	1.35	1.62	1.38	1.24	1.14	1.04	3.81
Means		.86	.97	1.08	1.25	1.47	1.26	1.06	.94	.89	
Departures		−.01	−.01	−.01	−.01	−.01	−.01	−.03	−.04	−.02	

Madison, Wis.

Sept. 4	7.06		0.83	0.86	1.11	1.35					8.87
Sept. 11	13.26				.91	1.32					16.94
Sept. 12	13.26				1.22	1.47					8.87
Sept. 21	6.55	.79	.86	1.10	1.22	1.44					6.81
Sept. 28	3.48		1.01	1.15	1.25	1.56	1.15				3.99
Sept. 30	4.78		.59	.68	.96	1.17	0.92				7.34
Means		.79	.82	.95	1.11	1.38	1.04				
Departures		+.03	−.06	−.06	−.04	−.01	−.01				

Lincoln, Nebr.

Sept. 9	13.26						0.99	0.79	0.64	0.54	15.27
Sept. 10	16.94		0.77	0.92	1.10	1.40	1.14	.94	1.82	.71	17.53
Sept. 11	18.77						1.12	.90	.73	.58	18.77
Sept. 12	11.48					1.31	1.10	.92			7.92
Sept. 15	13.72				1.03						16.94
Sept. 16	15.27		.79	.92	1.12		1.08	.88	.75	.67	16.94
Sept. 21	6.55	0.77	.88	1.01							6.81
Sept. 27	4.37							1.14	1.03		4.78
Sept. 28	3.48			1.05	1.24		1.12	.96	.83	.70	4.57
Sept. 30	8.23	.60	.73	.88	1.08		1.14	.92	.77	.67	9.91
Means		(.68)	.79	.96	1.11	(1.36)	1.10	.93	.80	.64	
Departures		−.06	−.05	−.01	−.03	−.06	−.06	−.05	−.03	−.08	

Blue Hill, Mass.

Sept. 1	15.7	0.73	0.81	0.92	1.06		0.88	0.66	0.54	0.39	17.5
Sept. 2	16.9	.79	.88	.97	1.10			.63	.42	.33	18.8
Sept. 3	17.5		.51	.62	0.78						19.5
Sept. 5	12.6								.51	.37	13.1
Sept. 6	9.0	.99	1.06	1.16	1.28	1.36	1.19	.98			7.4
Sept. 7	12.2				1.17		1.18				13.1
Sept. 13	18.8							.81	.61	.49	15.2
Sept. 14	12.2								.60	.48	13.1
Sept. 15	16.9							.52	.40	.28	24.0
Sept. 16	22.3					.98	.83				21.6
Sept. 17	22.4	.59	.66	.73	.89		.83	.62	.47		21.6
Sept. 18	21.7								.50	.35	22.4
Sept. 22	9.7							.86	.74	.61	12.2
Sept. 23	9.7	.66	.74	.84	.99						12.2
Sept. 24	14.6	.62	.70	.83	1.01						12.2
Sept. 25	9.4			1.08			1.08	.83	.64	.48	7.4
Sept. 28	9.0				1.27			1.01	.82	.69	5.8
Sept. 29	5.6	1.08	1.13	1.18					.77	.61	5.7
Sept. 30	6.3	1.01	1.06	1.16	1.27	1.22	1.09	.82	.66	.44	6.3
Means		.81	.84	.95	1.08	1.19	1.01	.77	.59	.46	
Departures		+.01	−.06	−.06	−.05	−.17	−.11	−.14	−.16	−.17	

* Extrapolated

TABLE 2.—*Daily totals and weekly means of solar radiation (direct+diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington	Madison	Lincoln	Chicago	New York	Fresno	Cambridge	Nashville	Twin Falls	New Orleans	Riverside	Blue Hill	Friday Harbor	Newport	State College	Put-in-Bay	San Juan u. v. below 3132 Å	Davis, Calif.	East Wareham
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*milli-cal.*		
September 3	491	282	316	210	480	563	298	260	577	609	403	353	469	453	381	66	-------	-------	445
September 3	441	540	219	490	165	565	[84	368	560	584	577	93	293	254	173	572	272	-------	177
September 5	440	499	300	362	515	561	474	335	566	388	536	466	280	525	569	515	344	-------	520
September 6	367	337	188	228	559	556	570	385	543	455	561	571	446	575	513	415	272	598	561
September 7	81	59	224	128	400	551	519	362	432	452	547	474	443	540	89	350	358	596	504
September 8	287	88	139	113	160	559	134	347	541	463	552	114	483	162	119	221	428	559	223
September 9	455	124	478	151	44	535	66	345	453	433	546	73	138	45	322	388	17	359	87
Mean	366	276	266	240	332	556	307	343	524	484	540	306	365	365	309	361	308	422	359
Departure	−12	−96	−171	−117	−37	−6	+60	-------	+18	+57	+62	−78	−43	−83	−107	-------	-------	-------	-------
September 10	285	477	520	402	214	558	200	368	540	249	460	212	357	284	365	307	262	596	248
September 11	407	473	495	446	211	544	56	379	391	339	518	70	460	101	197	318	155	596	79
September 12	262	517	468	345	191	536	204	361	471	613	521	108	311	125	345	301	273	593	175
September 13	354	311	149	400	535	536	496	374	480	380	533	409	312	496	580	489	477	575	447
September 14	487	488	450	475	509	538	452	350	502	377	507	458	104	505	480	460	292	569	486
September 15	450	306	434	412	384	526	370	110	519	96	511	375	391	374	289	282	363	564	375
September 16	439	397	492	405	405	508	418	141	528	25	528	375	127	266	466	458	170	546	223
Mean	383	424	430	412	350	535	314	298	490	297	511	299	293	307	389	374	301	577	290
Departure	+5	+78	+11	+16	−9	+8	−57	-------	+15	−56	+62	−71	−72	−82	−27	-------	-------	-------	-------
September 17	230	413	200	258	399	505	409	24	424	380	427	397	477	392	288	424	64	546	363
September 18	308	114	65	408	81	492	473	295	519	442	468	369	408	341	186	341	299	568	360
September 19	415	84	486	57	205	484	243	399	514	423	492	217	-------	239	356	236	-------	566	294
September 20	321	511	515	527	119	503	56	120	506	474	517	33	-------	63	316	489	-------	541	92
September 21	501	456	407	494	454	476	85	436	500	516	519	72	420	112	560	460	469	519	103
September 22	490	364	313	384	467	460	431	372	491	604	497	440	414	416	445	282	417	517	280
September 23	375	145	247	136	365	459	391	415	486	574	489	400	359	422	300	458	153	499	429
Mean	377	298	318	323	299	483	284	295	491	488	487	276	416	283	363	345	278	537	274
Departure	+2	−51	−91	−26	−41	−4	−87	-------	+56	+136	+16	−90	+81	−94	−46	-------	-------	-------	-------
September 24	434	121	209	340	287	455	394	334	484	-------	477	398	349	398	324	330	-------	462	414
September 25	467	285	22	116	475	461	445	362	425	-------	445	455	335	462	437	320	441	477	447
September 26	110	93	189	68	152	463	372	18	456	48	469	369	271	344	221	136	413	483	364
September 27	94	377	468	260	56	466	172	300	462	495	446	148	79	239	66	231	244	499	315
September 28	477	465	449	342	501	387	362	413	292	575	479	402	75	452	410	488	421	500	406
September 29	486	309	424	355	457	459	407	388	313	496	427	451	99	470	441	460	409	328	480
September 30	415	393	423	381	252	457	351	390	440	486	458	444	130	463	455	380	301	487	465
Mean	355	292	312	266	312	450	358	315	410	420	457	381	191	404	336	336	371	461	413
Departure	+4	−6	−50	−19	−1	+1	+33	-------	−31	+35	+5	+36	−97	+51	+30	-------	-------	-------	-------

ACCUMULATED DEPARTURES ON SEPTEMBER 30

	+1,638	−4,256	−7,651	+3,661	−2,723	+1,197	−5,390	-------	+2,415	+9,576	+10,318	−10,402	−2,842	−4,760	−5,803	-------	-------	-------	-------

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR SEPTEMBER 1942

[Communicated by Capt. J. F. Hellweg, U. S. N. (Ret)., Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count.

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	*h m*									
Sept. 1	11 35	7479	0	273	+3	4	97	4	F	U. S. Naval.
		7479	+5	278	+7	5	24	2		
				(273)	(+7)	-------	121	6		
Sept. 2	10 25	7482	−17	244	−7	22	97	7	G	Do.
		7481	+12	273	+12	13	24	6		
		7479	+15	276	+7	15	6	3		
				(261)	(+7)	-------	127	16		
Sept. 3	10 53	7482	−4	243	−7	14	48	5	G	Do.
		7481	+28	275	+12	29	48	3		
		7479	+28	275	+7	28	6	2		
				(247)	(+7)	-------	102	10		
Sept. 4	10 52	7482	+10	244	−7	17	48	9	VG	Do.
		7479	+38	272	+6	38	6	2		
		7481	+41	275	+12	41	48	8		
				(234)	(+7)	-------	102	19		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR SEPTEMBER 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	*h m*									
Sept. 5	11 12	7482	+23	244	−7	27	48	7	F	U. S. Naval.
		7481	+35	276	+13	55	24	2		
				(221)	(+7)	-------	72	9		
Sept. 6	11 6	7483	−39	169	−3	41	12	1	G	Do.
		7482	+37	245	−7	40	194	15		
		7481	+68	276	+13	68	6	1		
				(208)	(+7)	-------	212	17		
Sept. 7	9 56	7483	−25	170	−5	28	24	10	G	Mt. Wilson.
		7482	+50	245	−7	53	242	30		
				(195)	(+7)	-------	266	40		
Sept. 8	12 54	7482	+64	244	−8	66	194	13	F	U. S. Naval.
				(180)	(+7)	-------	194	13		
Sept. 9	10 33	7482	+77	245	−7	78	291	16	F	Do.
				(168)	(+7)		191	16		
Sept. 10	9 31	7483	+16	172	−7	21	18	5	VG	Mt. Wilson.
				(156)	(+7)		18	5		
Sept. 11	11 30	7483	+31	172	−7	36	24	7	G	Do.
				(141)	(+7)		24	7		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR SEPTEMBER 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1942	*h m*									
Sept. 12	9 15	7483	+44	173	−7	47	48	2	G	Mt. Wilson.
				(129)	(+7)		48	2		
Sept. 13	9 12	7484	−75	41	−8	76	48	4	G	Do.
		7485	−71	45	−16	74	145	1		
		7483	+57	173	−8	60	36	1		
				(116)	(+7)		229	6		
Sept. 14	11 14	7485	−50	43	−17	61	145	1	VG	U. S. Naval.
		7484	−58	44	−9	60	97	3		
		7488	−26	76	+10	26	6	1		
		7487	+17	119	+4	17	12	2		
		7487	+21	123	+6	21	24	4		
		7486	+46	148	+11	46	6	1		
		7483	+70	172	−8	71	12	1		
				(102)	(+7)		302	13		
Sept. 15	10 54	7485	−45	44	−17	50	145	1	VG	Do.
		7484	−44	45	−8	46	48	8		
		7487	+30	119	+3	31	12	2		
		7487	+35	124	+6	35	6	2		
				(89)	(+7)		211	13		
Sept. 16	10 43	7485	−31	45	−16	38	145	1	VG	Do.
		7484	−27	49	−8	32	24	6		
		7489	−23	43	−12	30	6	2		
				(76)	(+7)		175	9		
Sept. 17	9 15	*	−20	43	−5	23	6	2	VG	Mt. Wilson.
		7485	−18	45	−16	30	145	1		
		7484	−12	51	−7	20	12	2		
				(63)	(+7)		163	5		
Sept. 18	10 36	7485	−5	44	−16	23	97	1	F	U. S. Naval.
		7484	+2	51	−6	13	24	3		
				(49)	(+7)		121	4		
Sept. 19	10 9	7485	+8	44	−16	24	97	1	F	Do.
		7484	+15	51	−6	20	24	5		
				(36)	(+7)		121	6		
Sept. 20	11 6	7490	−85	298	+12	85	145	1	G	Do.
		7485	+22	45	−17	32	97	1		
				(23)	(+7)		242	2		
Sept. 21	12 6	7490	−70	299	+12	70	97	8	F	Do.
		7485	+36	45	−17	44	97	1		
				(9)	(+7)		194	9		
Sept. 22	11 12	7490	−57	299	+12	57	145	12	F	Do.
		7485	+49	45	−17	53	97	1		
				(356)	(+7)		242	13		
Sept. 23	10 30	7490	−44	299	+12	44	145	17	VG	Do.
		7485	+63	46	−17	67	48	1		
				(343)	(+7)		193	18		
Sept. 24	10 57	7490	−31	299	+13	31	73	7	G	Do.
		7490	−27	303	+12	27	12	3		
				(330)	(+7)		85	10		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR SEPTEMBER 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1942	*h m*									
Sept. 25	11 44	7491	−25	291	−5	28	48	3	F	U. S. Naval.
		7490	−17	299	+13	20	97	6		
				(316)	(+7)		145	9		
Sept. 26	9 33	7492	−27	277	+12	27	73	13	VG	Mt. Wilson.
		7491	−11	293	−5	16	48	5		
		7490	−3	301	+12	5	24	3		
				(304)	(+7)		145	21		
Sept. 27	9 24	7492	−13	278	+12	13	24	1	G	Do.
		7491	+3	294	−5	13	73	9		
		7490	+11	302	+12	12	24	3		
				(291)	(+7)		121	13		
Sept. 28	12 40	7491	+17	293	−7	22	97	10	F	U. S. Naval.
		7491	+21	297	−7	26	48	3		
				(276)	(+7)		145	13		
Sept. 29	10 40	*	−80	184	−4	80	24	1	VG	Do.
		7491	+29	293	−7	33	97	8		
		7491	+34	298	−7	37	97	7		
				(264)	(+7)		218	16		
Sept. 30	10 38	7491	+42	293	−7	45	121	17	VG	Do.
		7491	+47	298	−7	50	73	10		
				(251)	(+7)		194	27		

Mean daily area for 30 days = 161

(*) Not numbered.
VG=very good; G=good; F=fair; P=poor.

PROVISIONAL RELATIVE SUNSPOT NUMBERS FOR SEPTEMBER 1942

[Based on observations at Zurich. Data furnished through the courtesy of Prof. W. Brunner, Eidgenössische. Sternwarte, Zurich, Switzerland]

September 1942	Relative numbers	September 1942	Relative numbers	September 1942	Relative numbers
1	15	11	7	21	*Ec* 25
2	0	12	10	22	
3	*Mc* 28	13	*d* 26	23	21
4	21	14	33	24	11
5	20	15	32	25	*Mc* 20
6	14	16	16	26	
7	*15	17	8	27	
8	15	18	8	28	21
9	14	19	*a* 8	29	16
10	15	20	15	30	15

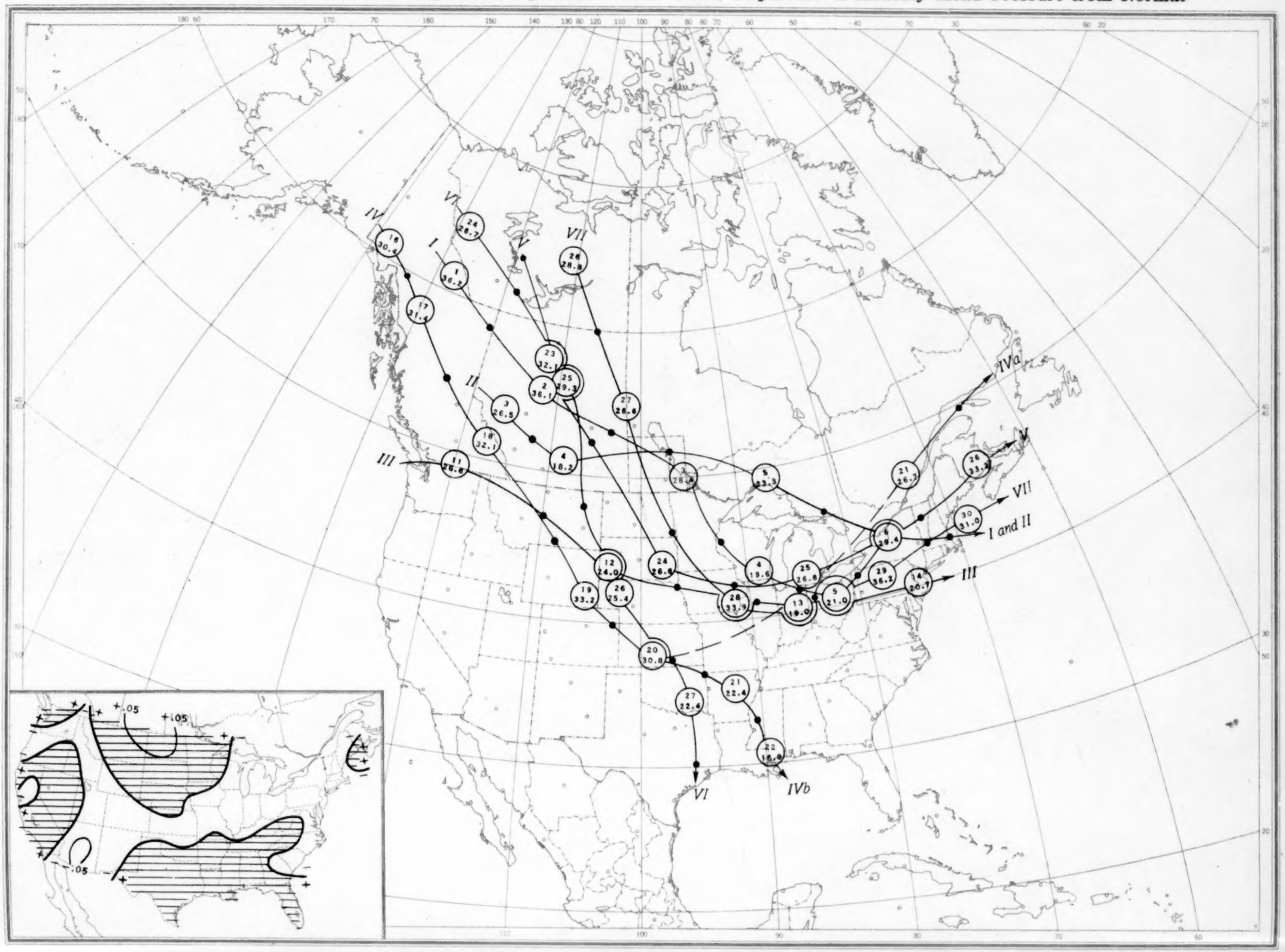
Mean, 27 days = 16.6

*Observed at Locarno.
a=Passage of an average-sized group through the central meridian.
b=Passage of a large group through the central meridina.
c=New formation of a group developing into a middle-sized or large center of activity: E, on the eastern part of the sun's disk; W, on the western part; M, in the central-circle zone.
d=Entrance of a large or average-sized center of activity on the east limb.

U. S. GOVERNMENT PRINTING OFFICE: 1942

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, September 1942

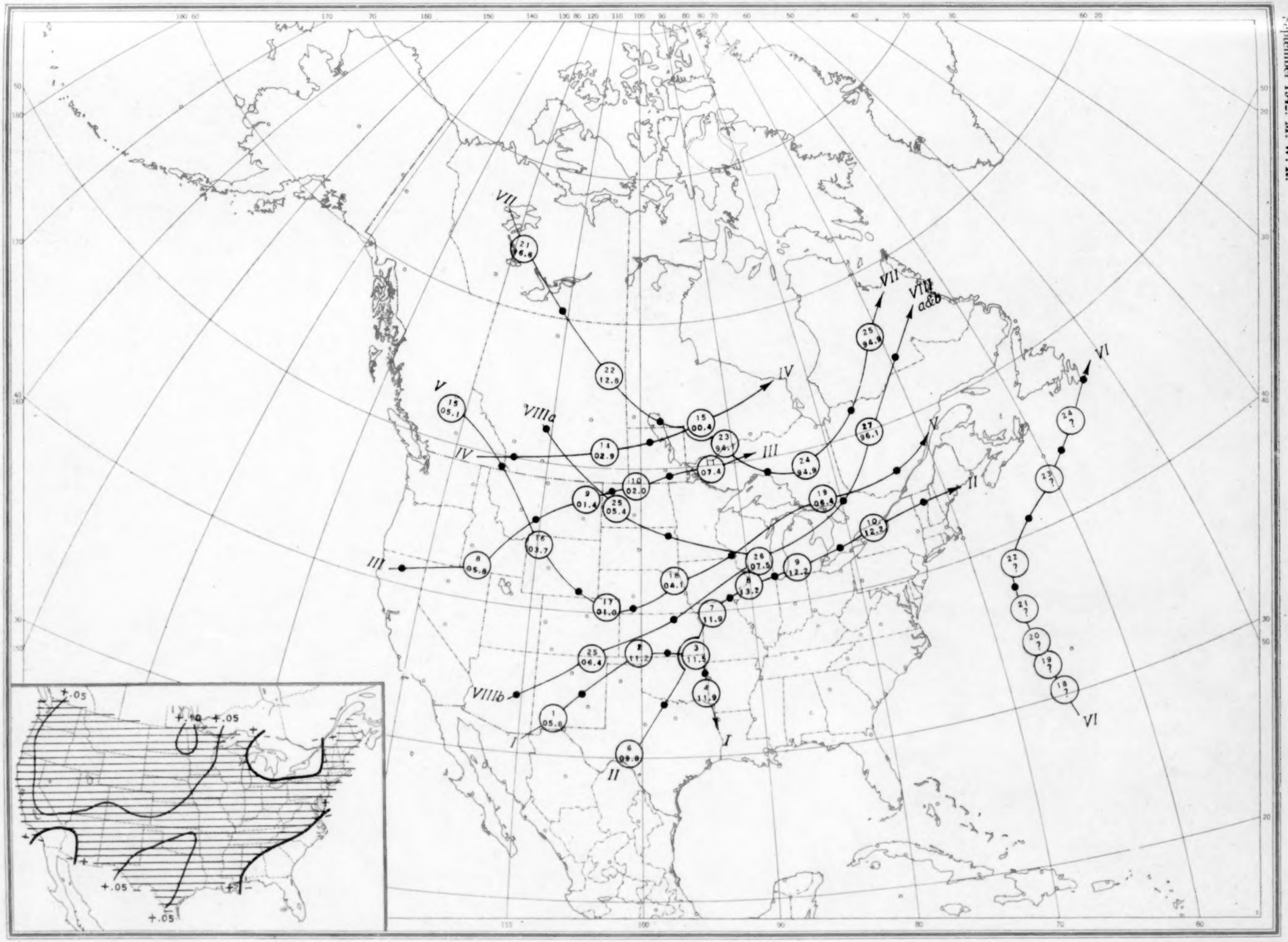
Chart II. Tracks of Centers of Anticyclones, September 1942. (Inset) **Departure of Monthly Mean Pressure from Normal**



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Chart III. Tracks of Centers of Cyclones, September 1942. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, September 1942

Chart V. Total Precipitation, Inches, September 1942. (Inset) **Departure of Precipitation from Normal**

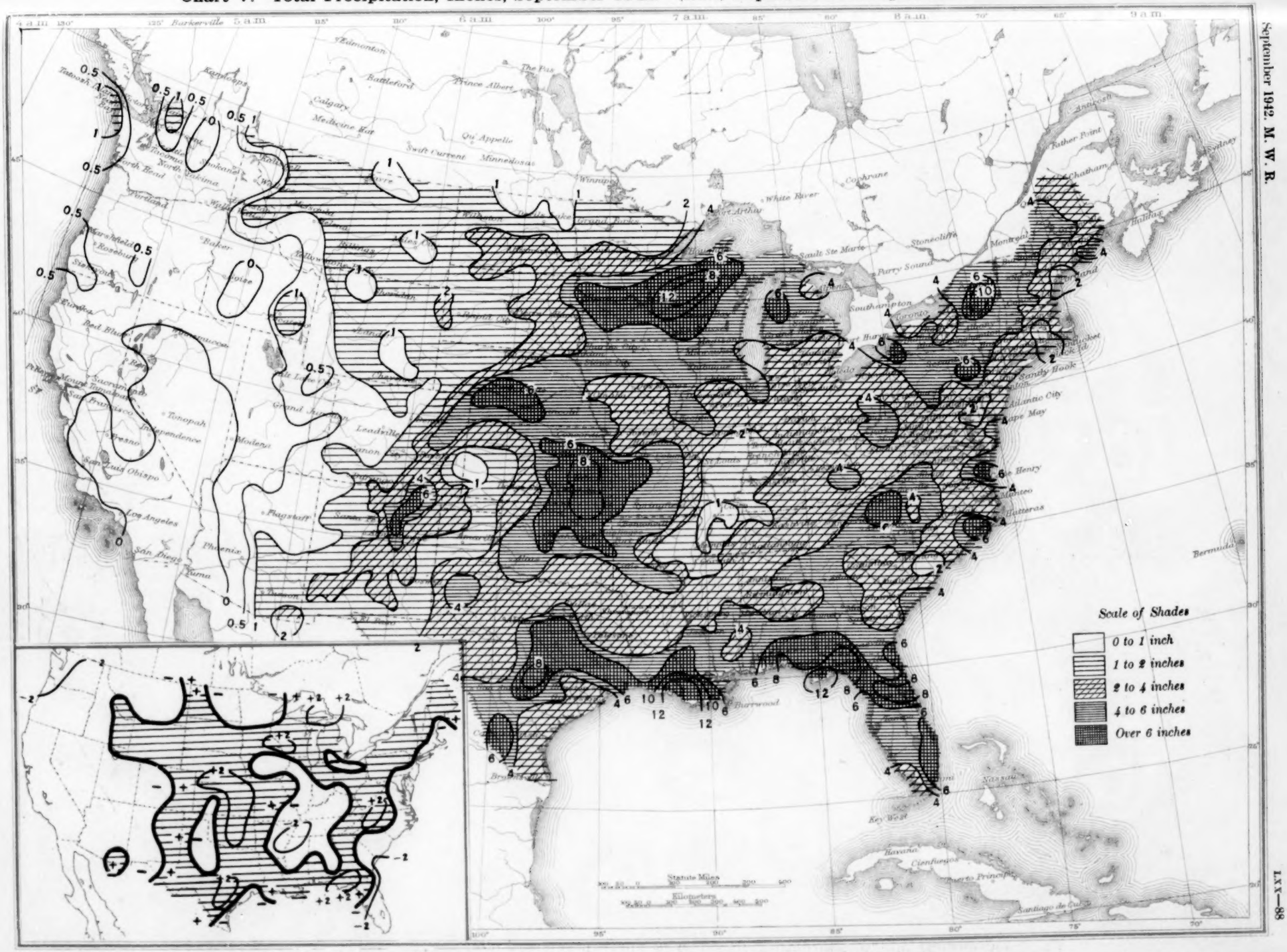


Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, September 1942

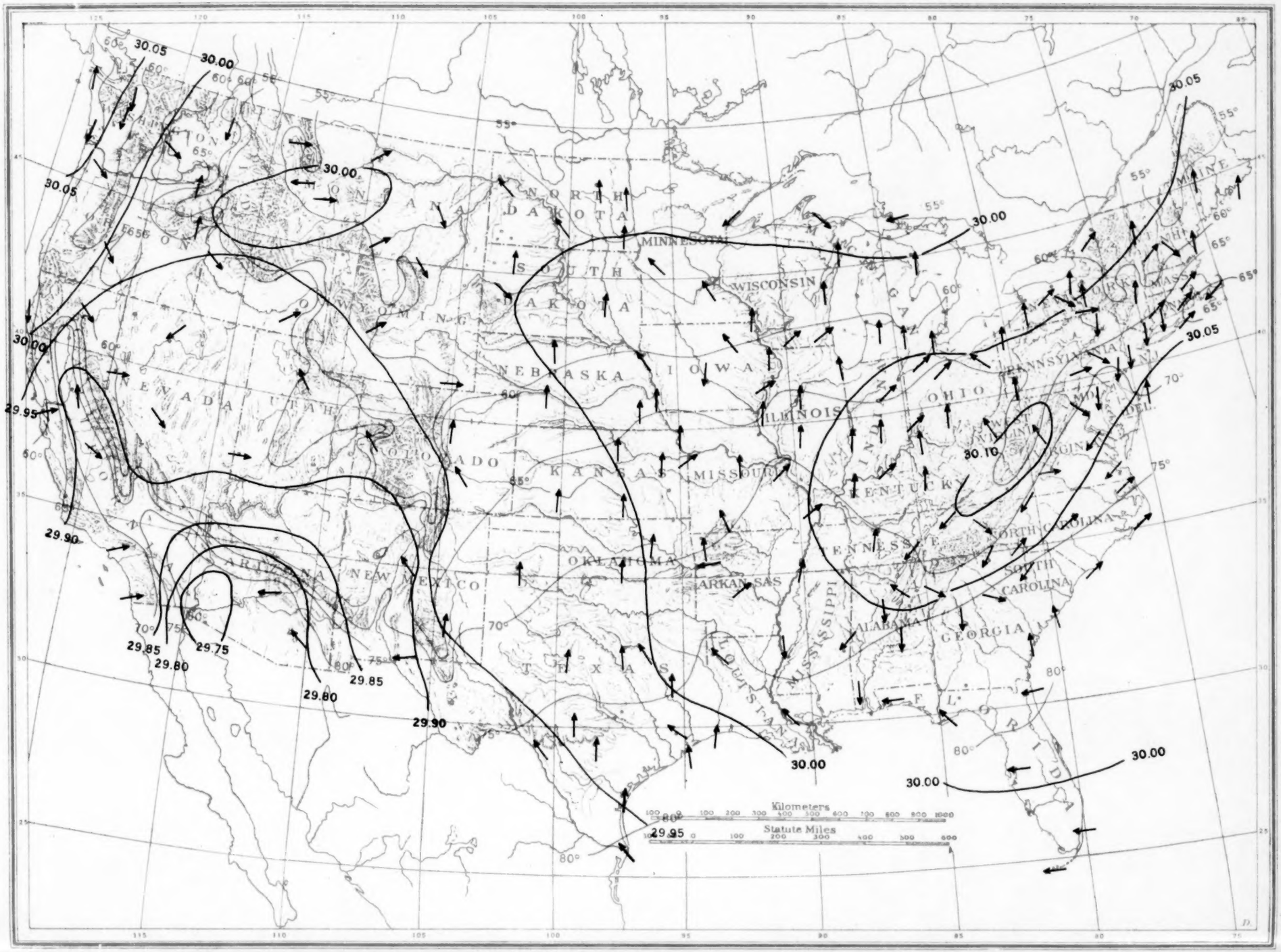


Chart VII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) September 1942

Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.) and Isotherms (°C.) and Resultant Winds for 1,500 Meters (m. s. l.) September 1942

Isobars and isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

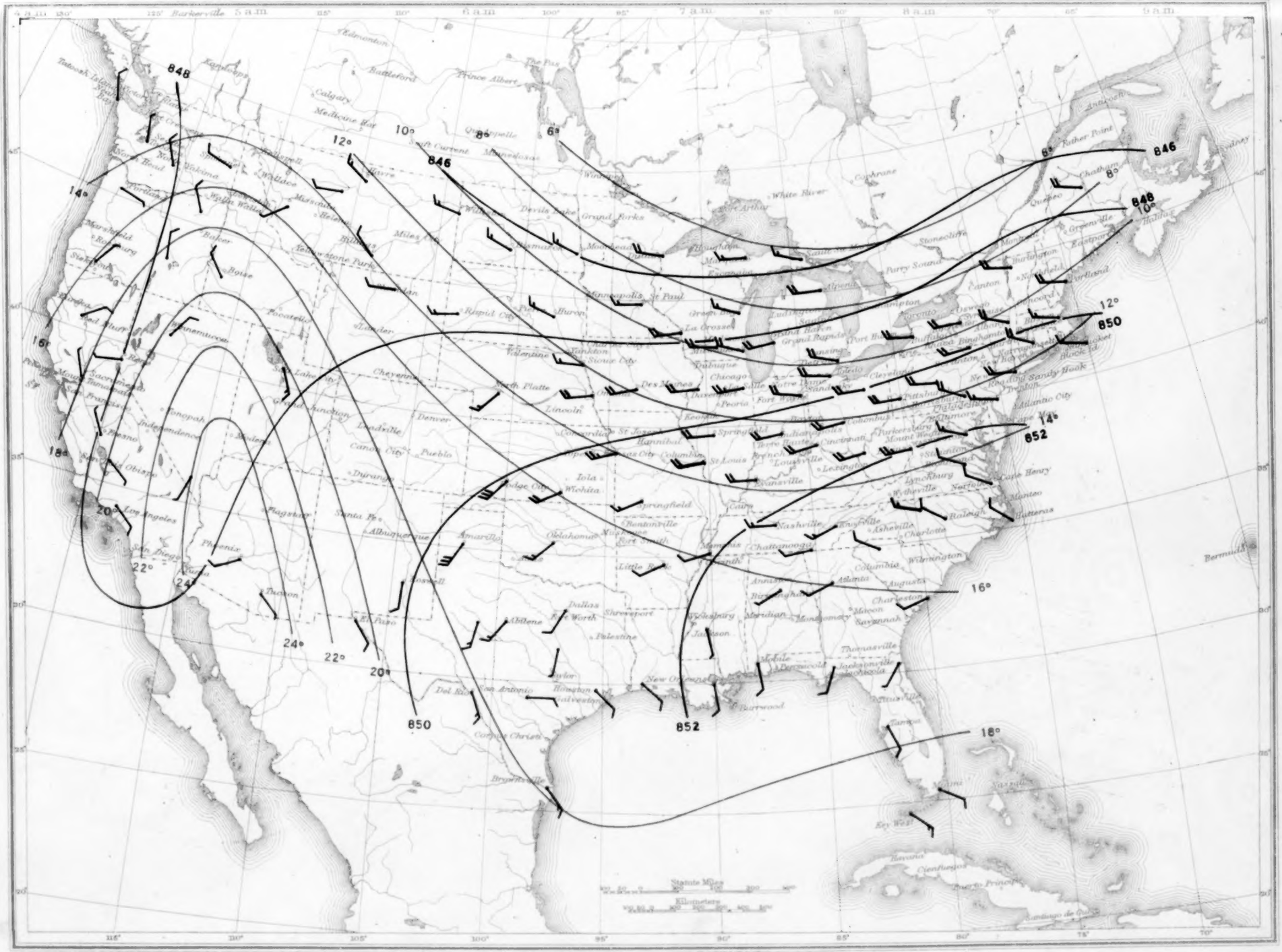


Chart IX. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T) and Resultant Winds 5:00 a.m. (E.S.T.) for 3,000 Meters (m.s.l.) September 1942

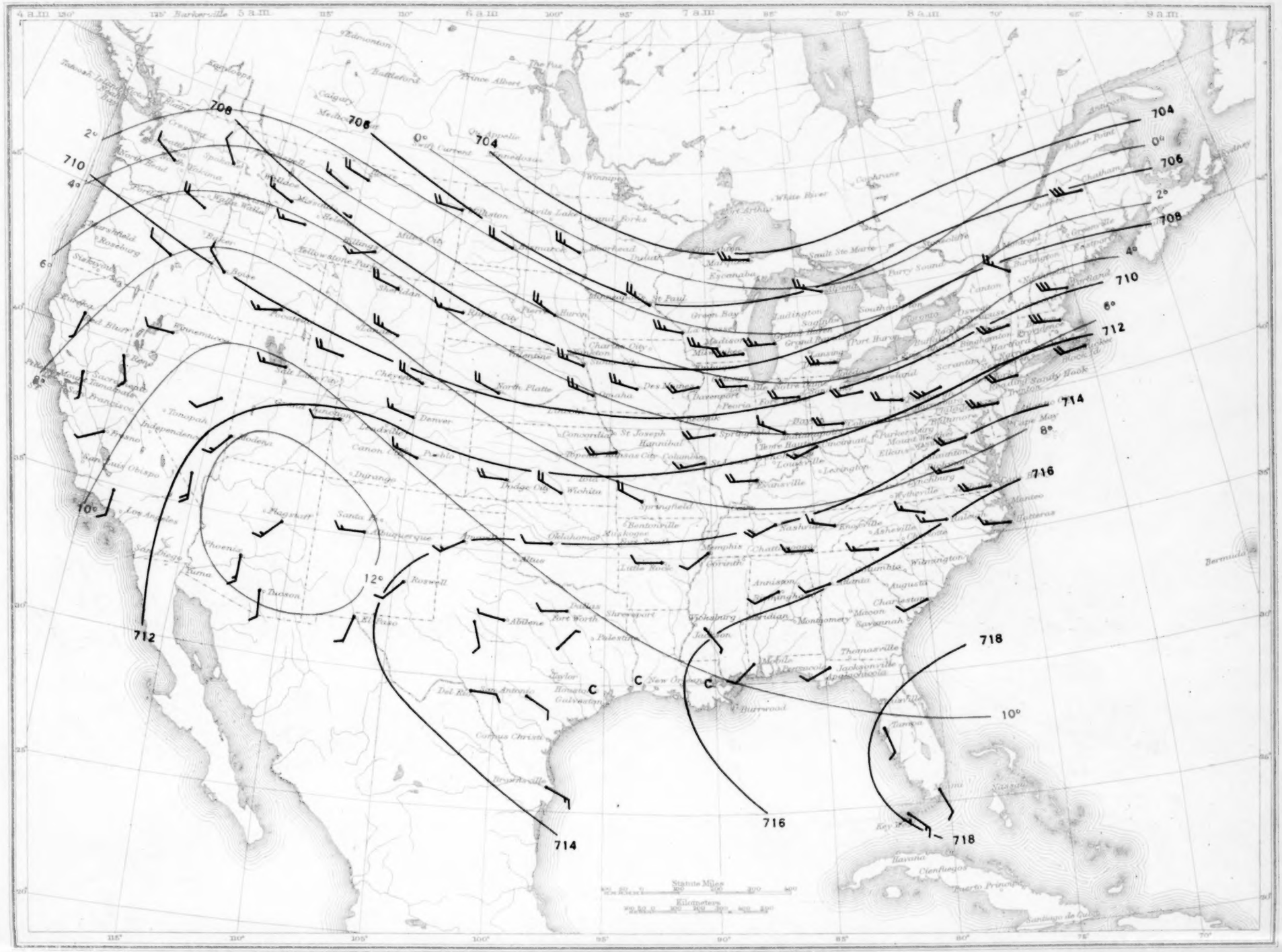


Chart X. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 5,000 Meters (m.s.l.) September 1942

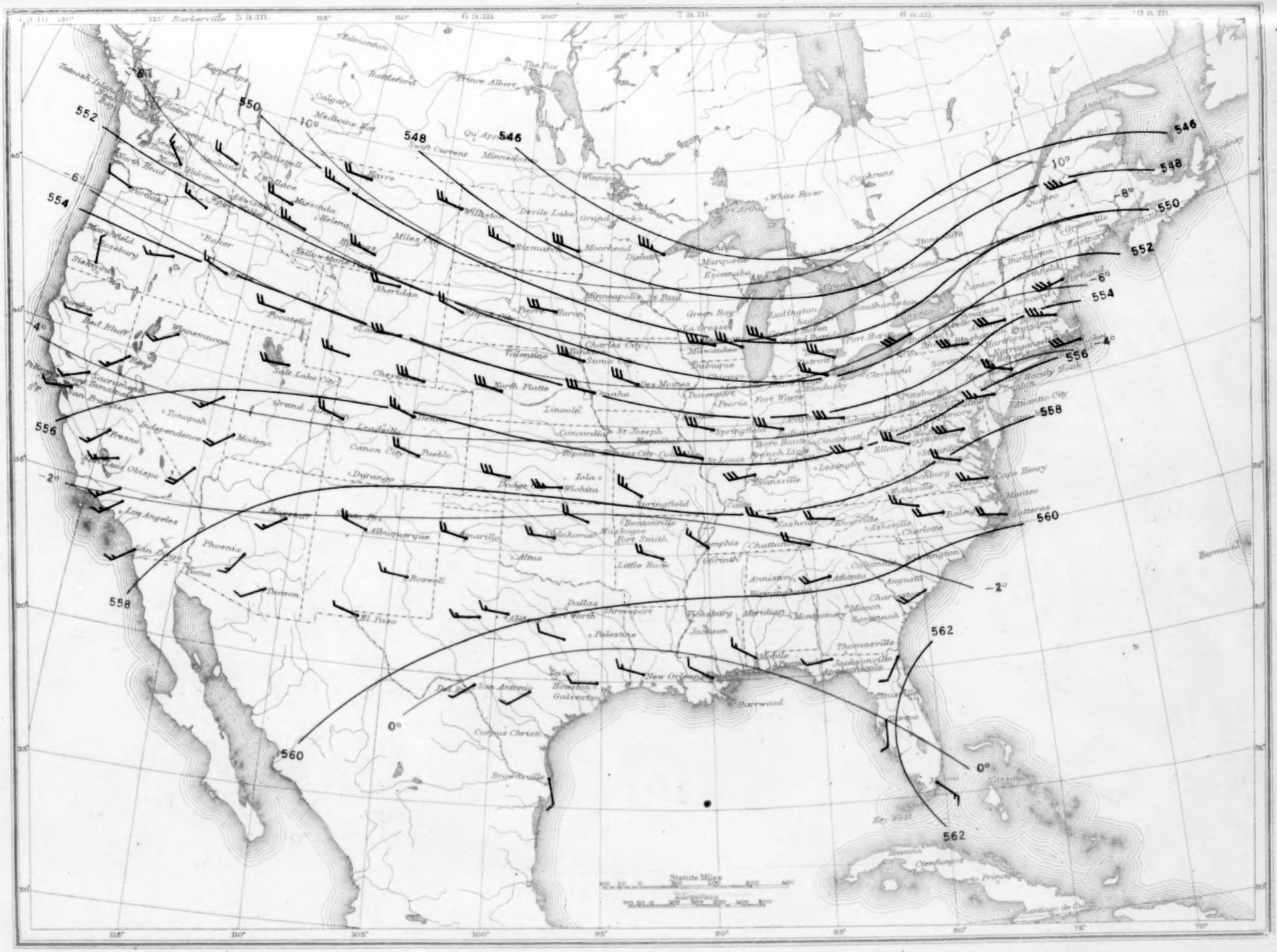
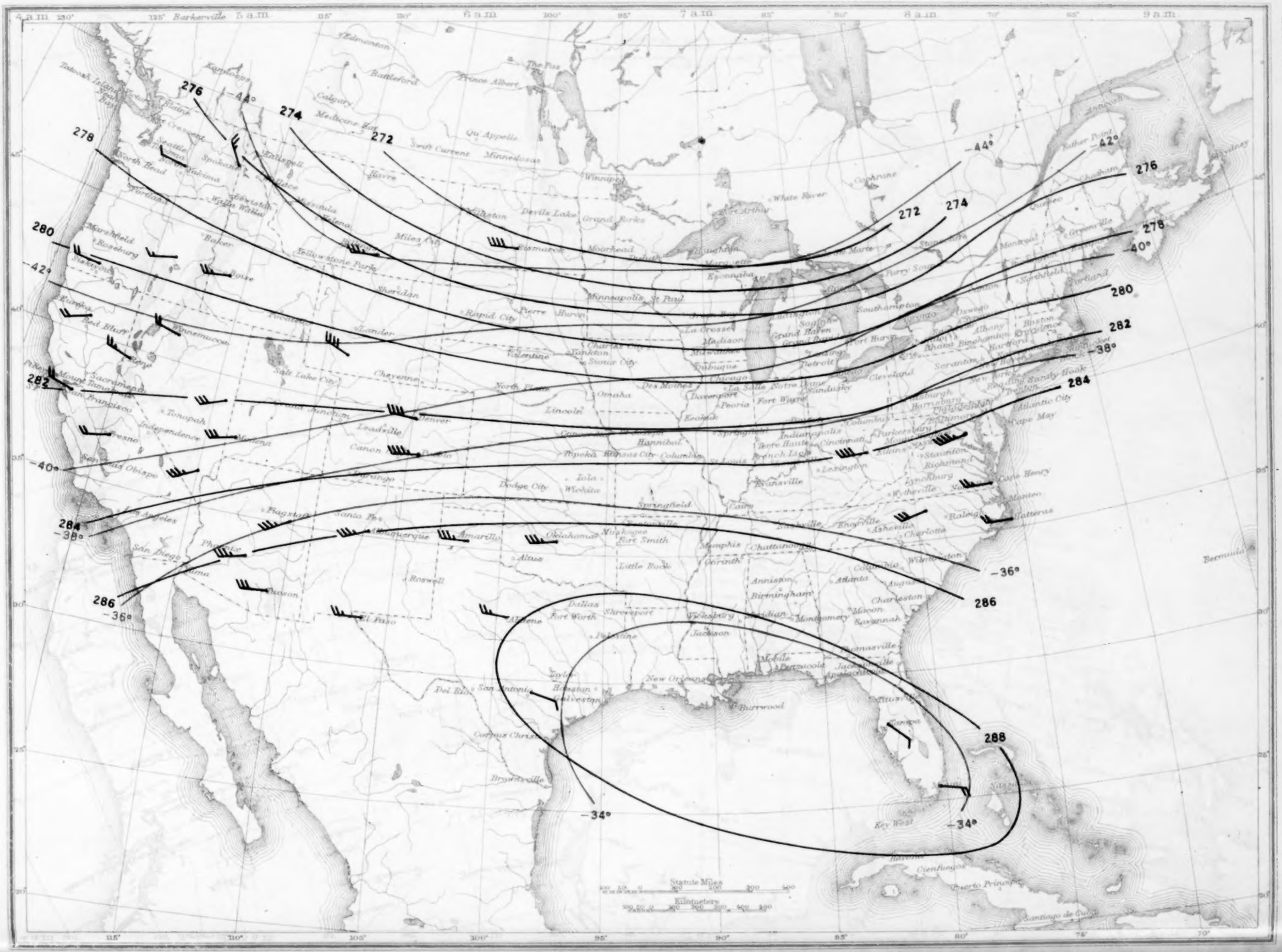



Chart XI. Isobars (mb) Isotherms (°C.) 11:00 p.m. (E.S.T.) and Resultant Winds 5:00 p.m. (E.S.T.) for 10,000 Meters (m.s.l.) September 1942